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STS-9 BET PRODUCTS

John T. Findlay, G. Mel Kelly, Michael L. Heck,
Judy G. McConnell, and Martin W. Henry

ANALYTICAL MECHANICS ASSOCIATES, INC.
17 Research Road
Hampton, Virginia 23666

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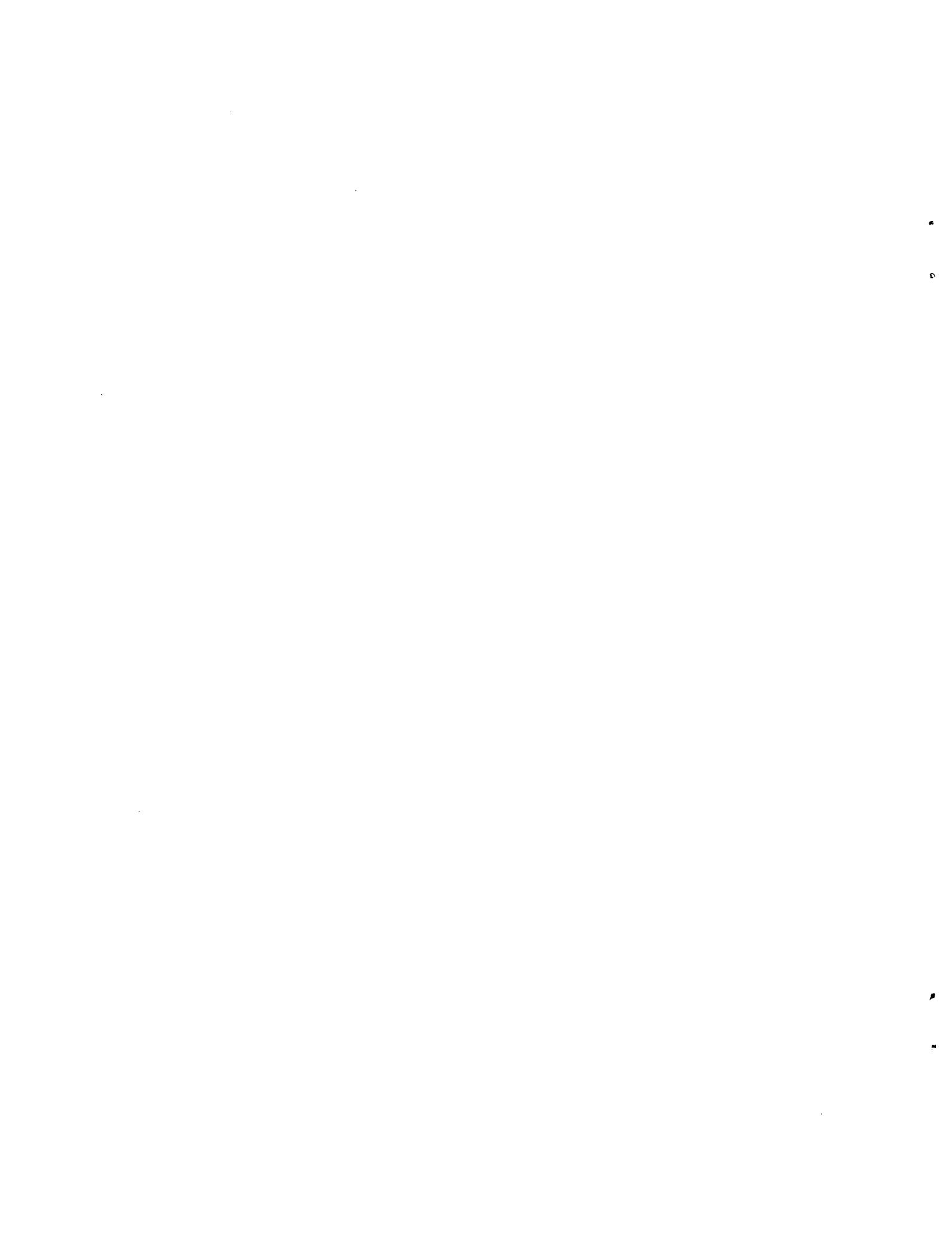
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FOREWORD

Due principally to the entry ground track for STS-9, the results for this flight are much more judgemental in nature than on the previous eight Shuttle flights. First, trajectory reconstruction accuracy is limited due to the lack of tracking coverage. Second, and most important, none of the available atmospheres yield the expected flight/data base comparisons based on previous Columbia experience. Readers are urged to peruse this report, particularly the section relating to atmosphere selection and the corresponding accuracy implications on flight derived aerodynamic coefficient extraction for this mission.

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
	ABSTRACT	iii
I	ENTRY TRAJECTORY RECONSTRUCTION	1
	I.a. Dynamic data	1
	I.b. Tracking data	1
	I.c. Reconstruction results	2
II	EXTENDED BET	18
III	AEROBET Discussion	37
IV	MMLE INPUT FILES	75
	APPENDIX A - Spacecraft and Physical Constants .	78
	APPENDIX B - Final Residuals for STS-9 Trajectory Reconstruction	83
	APPENDIX C - Listing of STS9BET Air Relative Parameters	97
	APPENDIX D - STS-9 Source and Output Products for Archival	161

ABSTRACT

This report presents the final products generated by the AMA, Inc. for the ninth NASA Space Shuttle Flight, STS-9, which landed on December 8, 1983. The trajectory reconstruction utilized an anchor epoch of $23^{\text{h}}17^{\text{m}}23^{\text{s}}.0$ (83843^S.0) GMT corresponding to an initial altitude of h~356 kft, selected in view of the limited tracking coverage available. The final state (BET9J13/UN=169750N) utilized IMU2 measurements and was based on processing radar tracking from six(6) C-bands and a single S-band station, plus six(6) photo-theodolite cameras in the vicinity of Runway 17 at Edwards Air Force Base. The final atmosphere (FLAIR9/UN=581199C) was based on a (judgemental) composite of the remote measured data and the 1978 Air Force Reference Atmosphere model as discussed in Section II. The Extended BET is available as STS9BET/UN=274885C. The AEROBET and MMLE input files created are discussed in Sections III and IV, respectively. Plots of the more relevant parameters from the AEROBET (reel number NL0624) are included therein. Appendices are presented defining input parameters, final residual plots, a trajectory listing, and data archival information. The following events are tabulated for later referral:

	<u>GMT</u>	<u>time from epoch</u>
Main gear deployment	85623	1780
Main gear touchdown (WOW)	85643	1800
Nose gear touchdown (WONG)	85657	1814
Stop time	85695	1852



I. Entry Trajectory Reconstruction

I.a. Dynamic Data

Time homogeneous ~ 1 Hz measurements from IMU2 were selected as the dynamic data source for STS-9 entry reconstruction. Figure I-1 presents strip charts over five hundred(500) second intervals of the Shuttle Columbia dynamics during the ninth entry flight. Plotted are body axes rates and accelerations derived from the IMU2 measured ΔV_{M50} and quaternions. Time zero on these charts corresponds to the processing epoch of 83843 GMT seconds ($h \sim 357$ kft).

Two significant anomalies associated with the dynamic data occurred on this flight. First, all entry data from IMU1 were lost due to hardware malfunctions. Second, a sizeable error in the spacecraft clock was introduced when attempts were made by the crew to "recover" from these malfunctions. The loss of IMU1 data precluded use of some of the standard procedures for relative IMU performance evaluation post flight, for example, mid-value determinations. The onboard clock error, as determined by the JSC, amounted to a 0.074 lag relative to the station clocks. Therefore, the time tags of all onboard measurements were adjusted by $+0.074$ prior to post flight processing.

With the loss of IMU1, consistency checks were made using IMU2 and IMU3. In terms of the total sensed ΔV (magnitude), these two IMUs agreed to within 1.3 fps. Comparisons of the derived body axes rates and accelerations for the two IMUs showed differences comparable to those obtained across IMUs on previous flights. One major data gap of ~ 10 sec duration resulted in loss of all data from each IMU in the interval from $\sim 155^s$ to $\sim 165^s$ from epoch. Since comparative results showed no preferred IMU for this flight, IMU2 was arbitrarily chosen.

I.b. Tracking Data

Since the major portion of the STS-9 entry occurred at high latitudes over the Pacific, there were no tracking stations available for high altitude coverage. Consequently, for the first time, tracking coverage during entry commenced at C-band acquisition ($h \sim 170$ kft).

STS-9 tracking coverage consisted of an S-band pass from Goldstone, six(6) California based C-band radars, and six(6) cine-theodolite cameras in the vicinity of Runway 17 at Edwards. Tracking coverages are

depicted in Figures I-2 and I-3. Figure I-2 shows the entire ground track for STS-9 with stations (complexes) as noted. Times and corresponding altitudes at 500^s increments along the track are given. This figure clearly indicates the minimal tracking geometry available. Detailed tracking coverage is shown in Figure I-3. Figure I-3a shows the coverage from C-band acquisition to final approach, while Figure I-3b shows the approach and landing segment. Times and altitudes are as indicated. Tracking station locations with respect to the ground track are also shown. Acronyms and locations utilized for the various trackers are given in Table I.

I.c. Reconstruction Results

Even with the absence of high altitude tracking, it was considered almost necessary to anchor the trajectory solution somewhere near Entry Interface. As mentioned, the epoch chosen for the reconstruction corresponds to h~357 kft. As such, the uncertainties in the estimates of the trajectory parameters at epoch are much larger than they would have been if high altitude tracking were available. In particular, conservative values of the 1 σ uncertainties in altitude and velocity at epoch are 3000 ft and 3 fps, respectively. Near the time of C-band acquisition, however, at h~170 kft, these uncertainties reduce to 300 ft and 1 fps, respectively.

In addition to the problem of increased uncertainties in the state estimates at epoch, the quality of fit to the available tracking data was not as good as in past flights. For example, the weighted statistics on the post-fit residuals for a state only solution were $\mu_w = +0.143$, $\sigma_w = 2.534$ with no significant improvement obtained by extension of the solution set to include either accelerometer scale factors ($\mu_w = -0.179$, $\sigma_w = 2.096$) or accelerometer biases ($\mu_w = -0.156$, $\sigma_w = 2.159$). Other combinations of state and instrument parameters in the solution set resulted in unrealistically large estimates of the instrument error model parameters. A change of anchor epoch to a point near C-band acquisition resulted in no change to the state only solution and, again, little improvement with an extended solution set. Moving the anchor epoch and restricting the tracking data to theodolite observations exclusively produced a good fit only when the arc was anchored at h~14 kft, i.e., after the vehicle had been aligned with the runway. Short arc solutions using IMU3 were poorer fits to the tracking data than those obtained using IMU2.

The final BET solution for STS-9 is presented in Table II. The final solution, BET9J13, was obtained solving for state and three accelerometer scale factors. Also shown in Table II are other "candidate" solutions, namely, the initial estimate from the onboard Navigation system, the JSC/TRW estimate, the state only ENTREE estimate and the state/accelerometer bias ENTREE estimate. With the exception of the NAV state, these various estimates were used to define the uncertainties quoted earlier. Although the solution BET9F01 had initial altitude and velocity lying between the JSC/TRW BET and the NAV, the solution BET9J13 yielded a slightly better fit to the tracking data and marginally better end conditions. Therefore, the adopted, albeit uncertain, solution for this flight is BET9J13. The residuals, by station and data type, for the solution are shown in Appendix B. Composite range, azimuth and elevation residuals are included in this section as Figures I-4, I-5, and I-6, respectively. Table III presents a summary of the residuals by station.

Comparisons of the final BET position and velocity after rollout on Runway 17 versus post-landed survey values are given below:

END CONDITIONS AT VEHICLE STOP (Runway #17 Coordinates)

	<u>Survey</u>	<u>BET9J13</u>
X, ft	+10113	+10155
Y, ft	0	+4
h-h _{RW} , ft	+16	+15
X, fps	0	+0.04
Y, fps	0	-0.11
h, fps	0	+0.22

Figure I-7 presents plots of the BET during rollout on Runway 17. Surveyed values are depicted thereon. Vehicle stop occurs 1852 seconds after epoch.

TYPE	STATION NO.	STATION NAME	LATITUDE (GEOD.) (DEG)	LONGITUDE (DEG)	ALT (ABOVE REF.) (FT)	MODULUS OF REFRACTION	SCALE HEIGHT (M)
C-BAND, FPQ-6	2	PTPC	37.49784	237.50039	-27.0341	321.	7352.
C-BAND, TPO-18	3	VDPC	34.66587	239.41865	203.5433	317.	7392.
C-BAND, FPS-16	5	VDSC	34.58276	239.43853	1972.1457	299.	7168.
THEODOLITE	6	THE01	34.91673	242.29058	2742.4000	N/A	N/A
THEODOLITE	7	THE06	34.79658	242.16983	2303.0100	N/A	N/A
THEODOLITE	8	THE05	34.83905	242.29574	2701.7000	N/A	N/A
C-BAND, FPS-16	9	FRCC	34.96083	242.08856	2480.3478	288.	7823.
C-BAND, FPS-16	10	EAFC	34.96962	242.06974	2521.7192	288.	7804.
THEODOLITE	11	THE07	34.92839	242.23770	2378.5000	N/A	N/A
S-BAND, N-S	12	GDSS	35.34221	243.12654	2994.4600	281.	7885.
THEODOLITE	14	THE09	34.94739	242.08924	2370.2200	N/A	N/A
THEODOLITE	16	THE15	34.89239	241.99087	2696.6400	N/A	N/A
C-BAND, FPS-16	20	PPTC	37.49770	237.50136	6.7257	320.	7375.

TABLE I. STS-9 station locations and refraction data.

EPOCH: 12/8/83 23^h17^m23^s (83843^s) GMT

DATA TYPES: S-band, 1 radar (GDSS)
 C-band, 6 radars (PTPC, PPTC, VDBC, VDSC, FRCC, EAFC)
 Cine-theodolite, 6 cameras (THE01, THE05, THE06, THE07, THE09, THE15)
 5° elevation angle constraint on C, S-band; No constraint on theodolite

Parameter	<u>Initial Estimate, NAV</u>	<u>JSC/TRW</u>	<u>BET9J12</u> ⁽¹⁾	<u>BET9F01</u> ⁽²⁾	<u>Final Solution, BET9J13</u> ⁽³⁾
V_R , fps	24905.1	24900.2	24907.9	24902.6	24905.8
γ_R , deg	-1.212	-1.209	-1.194	-1.203	-1.192
ψ_R , deg	60.271	60.245	60.223	60.240	60.234
h_D , ft	359605.	361853.	355596.	360225.	356924.
ϕ_D , deg	51.819	51.810	51.793	51.799	51.797
λ , deg	146.764	146.733	146.711	146.733	146.725
ψ , deg	61.299	see	61.243	61.256	61.274
θ , deg	39.725	Appendix	39.815	39.719	39.732
ϕ , deg	2.228	B	2.467	2.264	2.267
μ_w	—	—	+0.143	-0.156	-0.179
σ_w	—	—	2.534	2.159	2.096

(1) state only

(2) state and accelerometer biases (Biases in μg are: +81, +38, -5 in X, Y, Z)

(3) state and accelerometer scale factors (Scale factors in ppm are: +83, +39, -177 in X, Y, Z)

TABLE II. STS-9 solution and comparisons.

OBSERVATION STATISTICS BASED ON FINAL STATE

STATION NO.	OBSERVATION NAME	OBSERVATION TYPE	ACCEPTED	AVERAGE WEIGHT. RES.	AVERAGE RESIDUAL	STANDARD STAND. DEV.	WEIGHTED STAND. DEV.
2	PTPC RANGE	114 OF	114	.26934418E+01	.81351744E+02	.62464429E+02	.20779308E+01
2	PTPC AZIMUTH	122 OF	122	.17242438E+01	.19758378E-01	.16005256E-01	.13967221E+01
2	PTPC ELEVATION	127 OF	127	-.43575679E+00	-.53246702E-02	.10140567E-01	.75864770E+00
3	VDPC RANGE	124 OF	124	-.24359066E+01	-.74422861E+02	.58542495E+02	.19165878E+01
3	VDPC AZIMUTH	141 OF	141	-.17560153E+00	-.20122453E-02	.47150224E-02	.41146333E+00
3	VDPC ELEVATION	140 OF	140	-.20713445E+00	-.33360038E-02	.63165523E-02	.37478806E+00
5	VDSC RANGE	118 OF	118	-.26944870E+01	-.82283531E+02	.55380309E+02	.18134030E+01
5	VDSC AZIMUTH	130 OF	130	.52700863E+00	.60390740E-02	.77428376E-02	.69314334E+00
5	VDSC ELEVATION	130 OF	130	-.21982914E+01	-.34424684E-01	.77431157E-02	.45204069E+00
6	THE01 AZIMUTH	210 OF	210	-.93037300E-01	-.53306446E-03	.16527989E-01	.28846783E+01
6	THE01 ELEVATION	210 OF	210	-.26239754E+00	-.15034271E-02	.10429317E-01	.18202591E+01
7	THE06 AZIMUTH	112 OF	112	.94983037E-01	.54421272E-03	.39800936E-02	.69465739E+00
7	THE06 ELEVATION	112 OF	112	.11844800E+01	.67865708E-02	.49379691E-02	.86183819E+00
8	THE05 AZIMUTH	206 OF	206	.42015320E-02	.24073005E-04	.81415383E-02	.14209665E+01
8	THE05 ELEVATION	206 OF	206	-.47115950E+00	-.26995451E-02	.61799548E-02	.10786056E+01
9	FRCC RANGE	56 OF	56	-.34136575E+01	-.10430473E+03	.37253451E+02	.12041481E+01
9	FRCC AZIMUTH	64 OF	65	.72091871E-01	.82611199E-03	.75132787E-02	.65565725E+00
9	FRCC ELEVATION	65 OF	65	-.21281298E+01	-.31480354E-01	.13230232E-01	.77763295E+00
10	EAFC RANGE	254 OF	254	-.67333431E+00	-.20475793E+02	.40570144E+02	.13351381E+01
10	EAFC AZIMUTH	268 OF	268	-.11163921E+01	-.12732911E-01	.28165053E-01	.24578645E+01
10	EAFC ELEVATION	272 OF	272	-.31701277E-01	-.11372728E-02	.14425273E-01	.11724589E+01
11	THE07 AZIMUTH	149 OF	149	-.36313003E+00	-.20805818E-02	.20942805E-01	.36552090E+01
11	THE07 ELEVATION	149 OF	149	.68130006E-02	.39035618E-04	.14296588E-01	.24932254E+01
12	GDSS RANGE	169 OF	169	.27955347E+01	.31436502E+02	.18852112E+02	.16542086E+01
12	GDSS DOPPLER	167 OF	168	-.82065854E-01	-.78334264E-01	.24702805E+01	.24596789E+01
12	GDSS X-ANGLE	169 OF	169	-.76030541E+00	-.10781176E-01	.72205784E-02	.51700561E+00
12	GDSS Y-ANGLE	170 OF	170	.40431707E+00	.46356991E-02	.45502234E-02	.39681787E+00
14	THE09 AZIMUTH	178 OF	178	-.15568273E+00	-.89314223E-03	.20072467E-01	.35033064E+01
14	THE09 ELEVATION	178 OF	178	.27347470E+00	.15668946E-02	.68825561E-02	.12012326E+01
16	THE15 AZIMUTH	202 OF	202	-.22681305E+00	-.12995478E-02	.11585699E-01	.20220860E+01
16	THE15 ELEVATION	202 OF	202	-.72412257E+00	-.41489167E-02	.49211445E-02	.65890174E+00
20	PPTC RANGE	123 OF	123	.19285391E+01	.58199514E+02	.61072783E+02	.20245821E+01
20	PPTC AZIMUTH	137 OF	139	.52841576E+00	.80551785E-02	.13102482E-01	.11434073E+01
20	PPTC ELEVATION	139 OF	139	-.12566135E+01	-.17366400E-01	.10218381E-01	.74315089E+00

TOTAL WEIGHTED FIT STATISTICS--- NOBS = 5315 WGT. MEAN = -.17864423E+00 WGT. STD. DEV. = .20956334E+01

Table III. STS-9 residual summary.

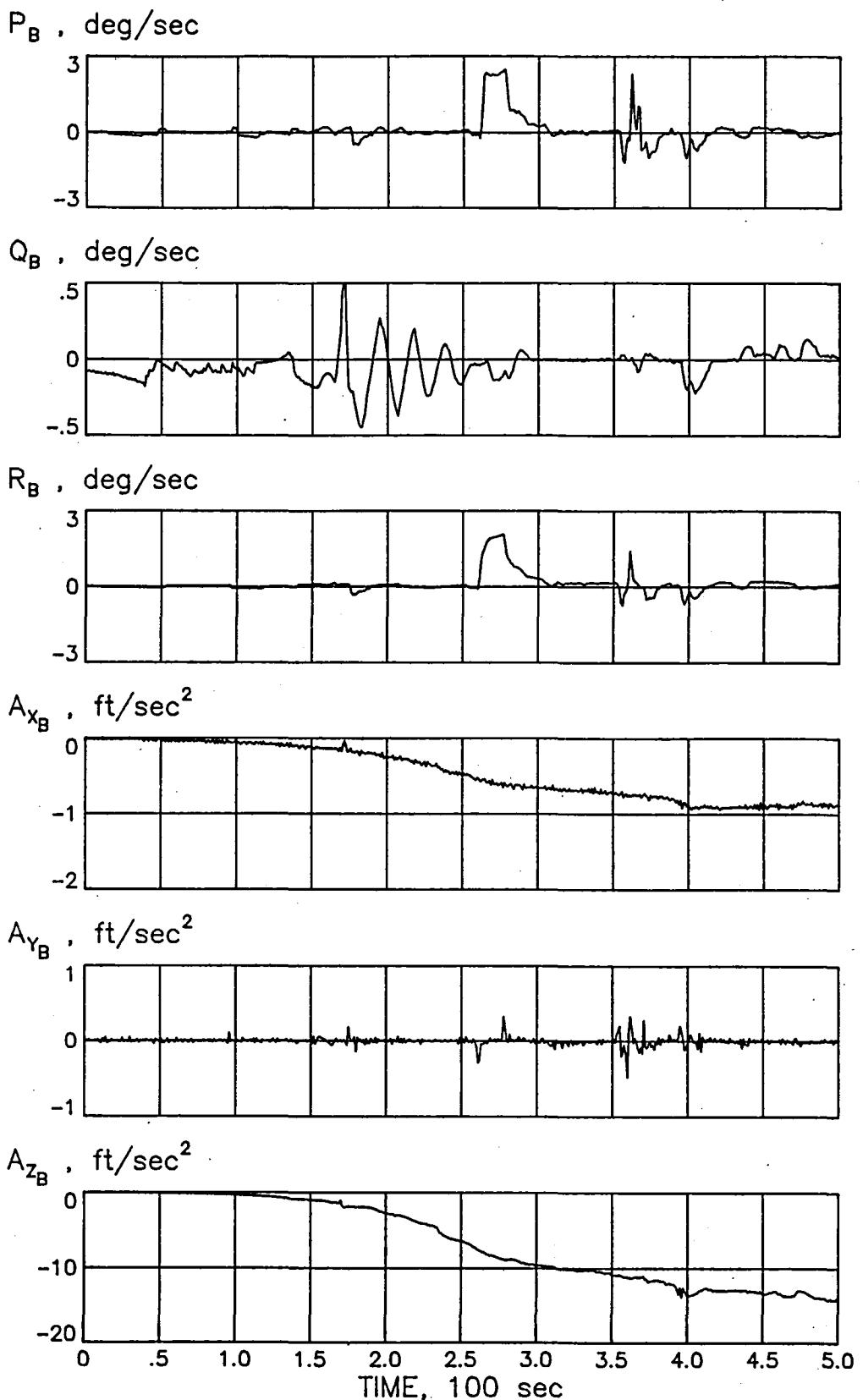


Figure I-1. STS-9 Dynamic data , IMU 2

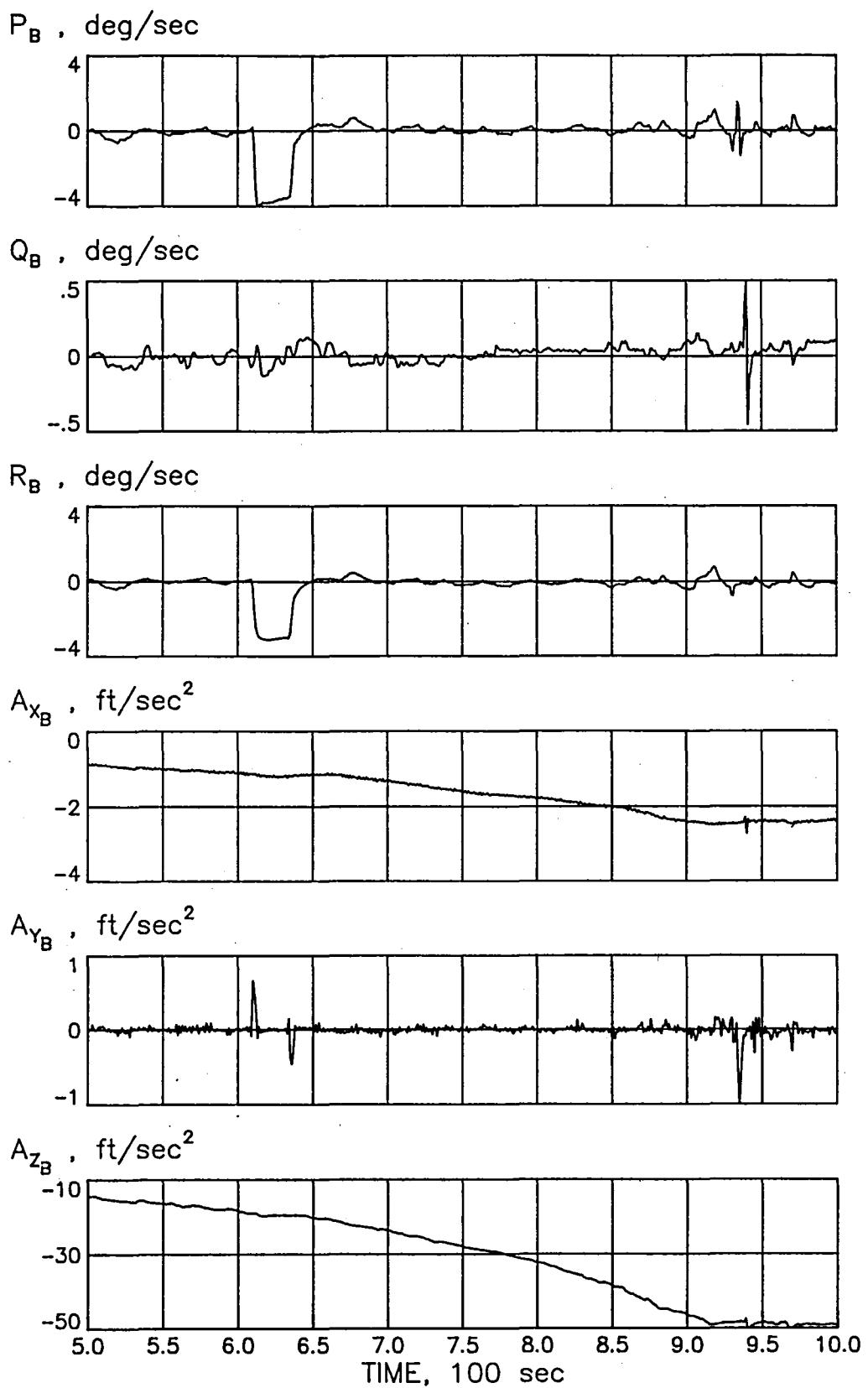


Figure I-1. (continued)

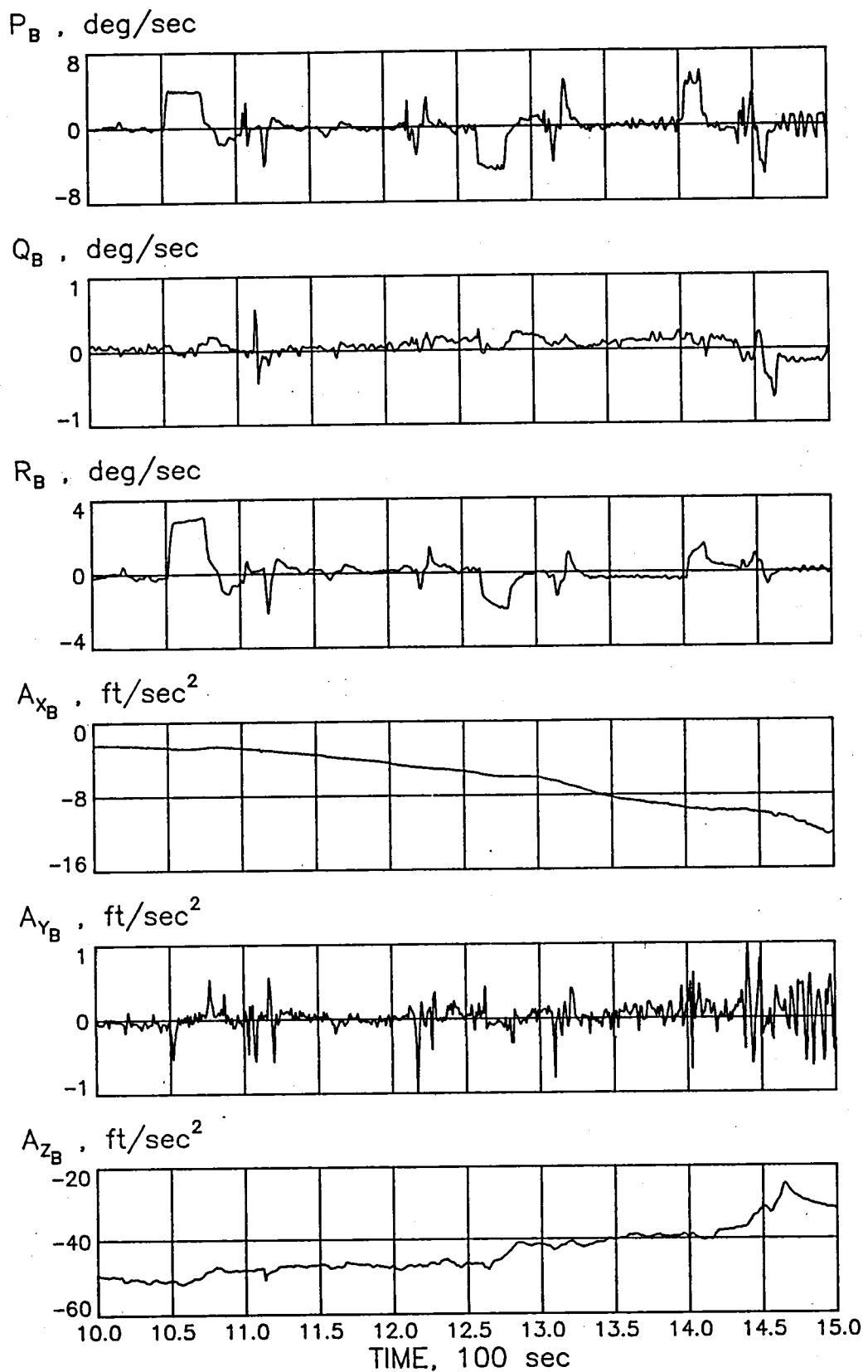


Figure I-1. (continued)

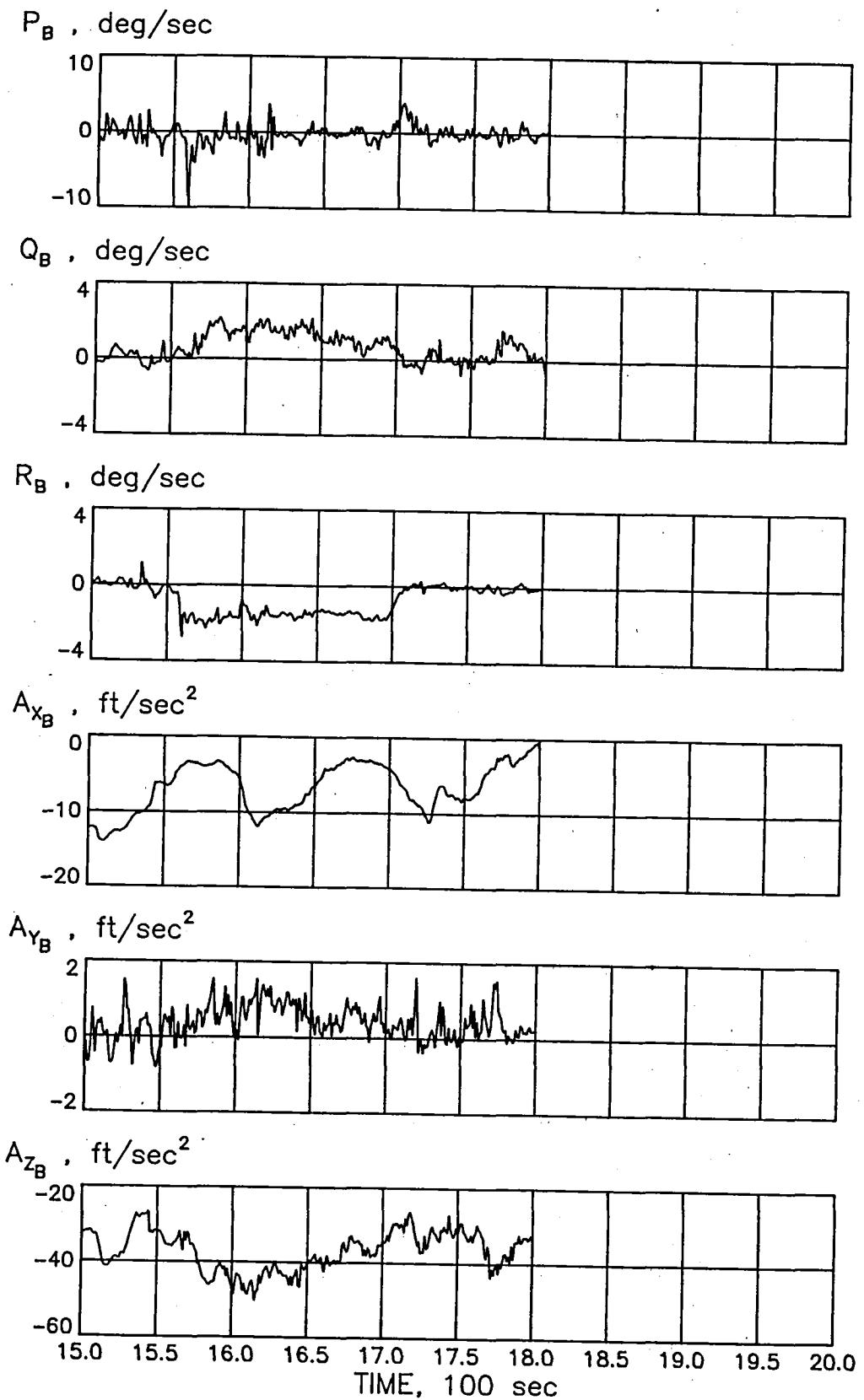


Figure I-1. (concluded)

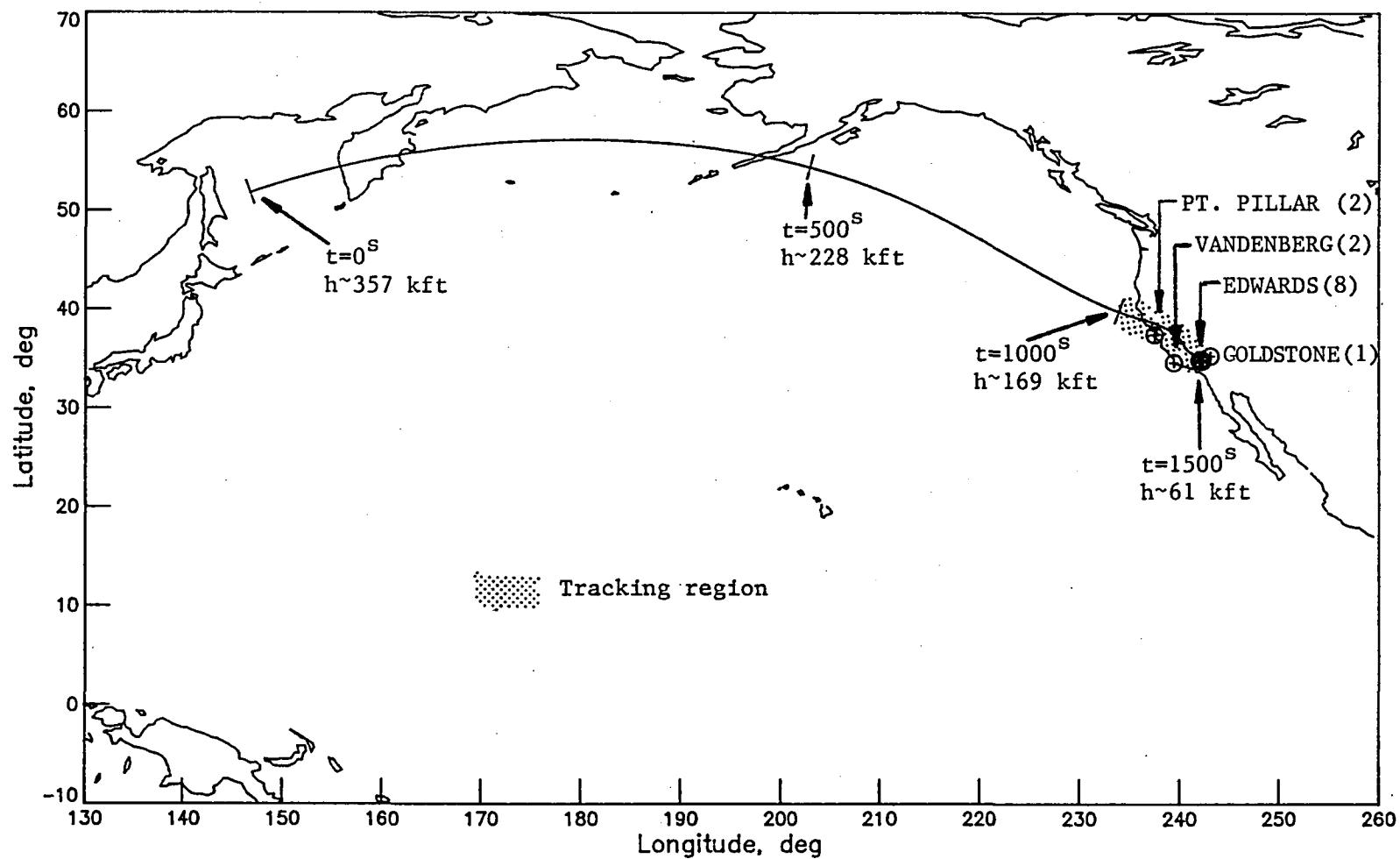
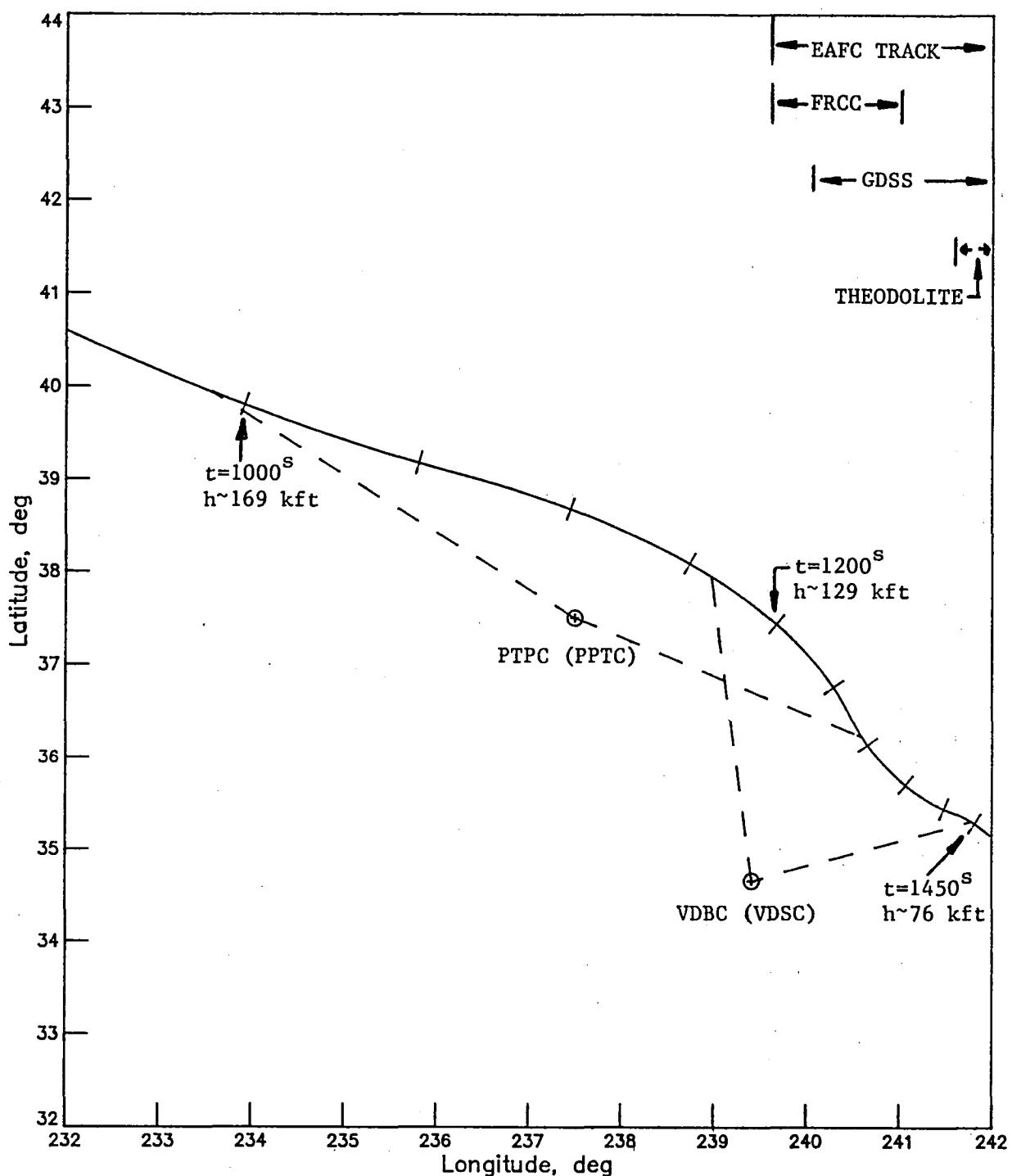
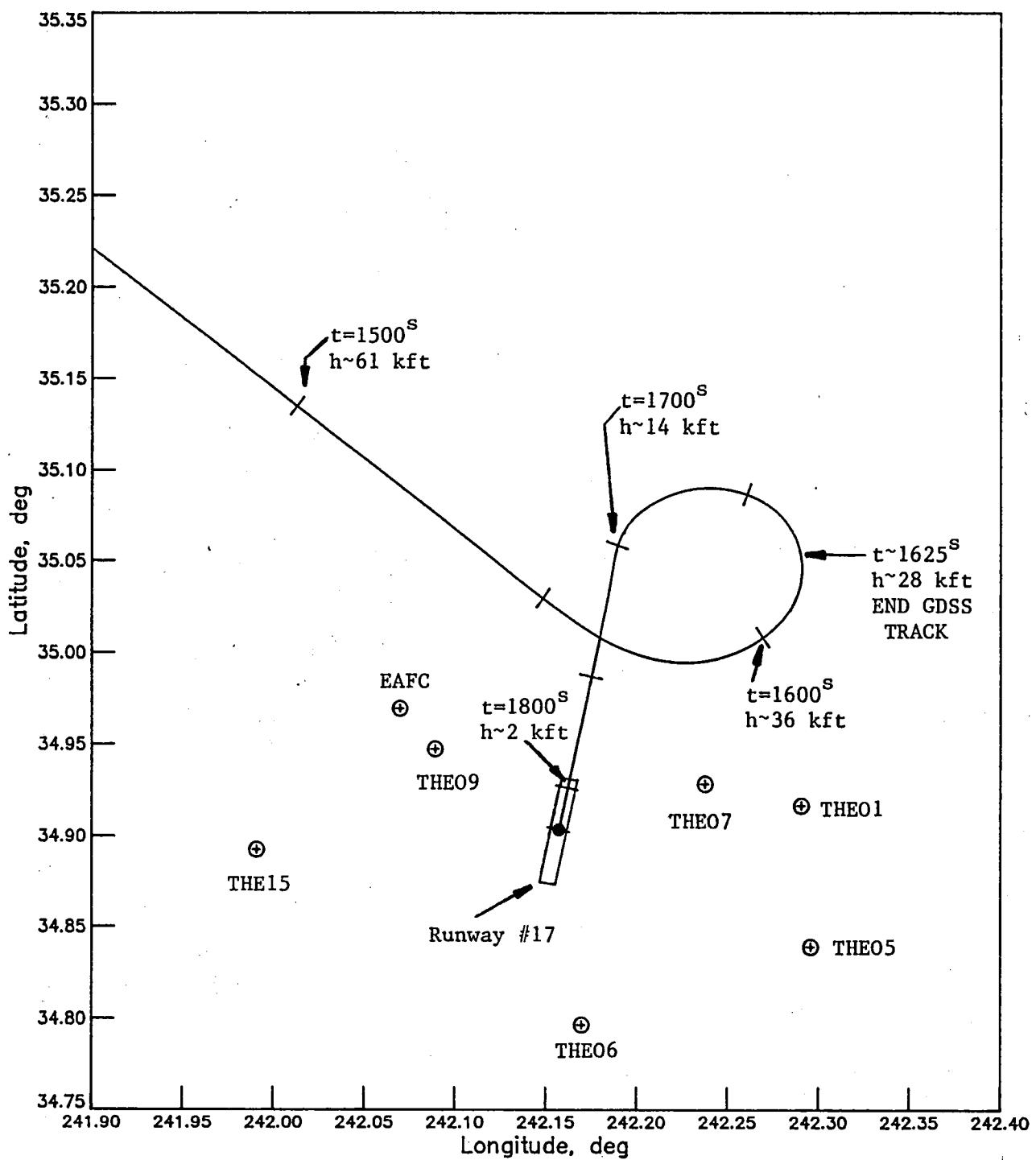


Figure I-2. STS-9 ground track from epoch to touchdown.



(a) C-band acquisition to final approach

Figure I-3. Detailed tracking coverage for STS-9.



(b) Final approach and landing

Figure I-3. (Concluded).

O-C, ft

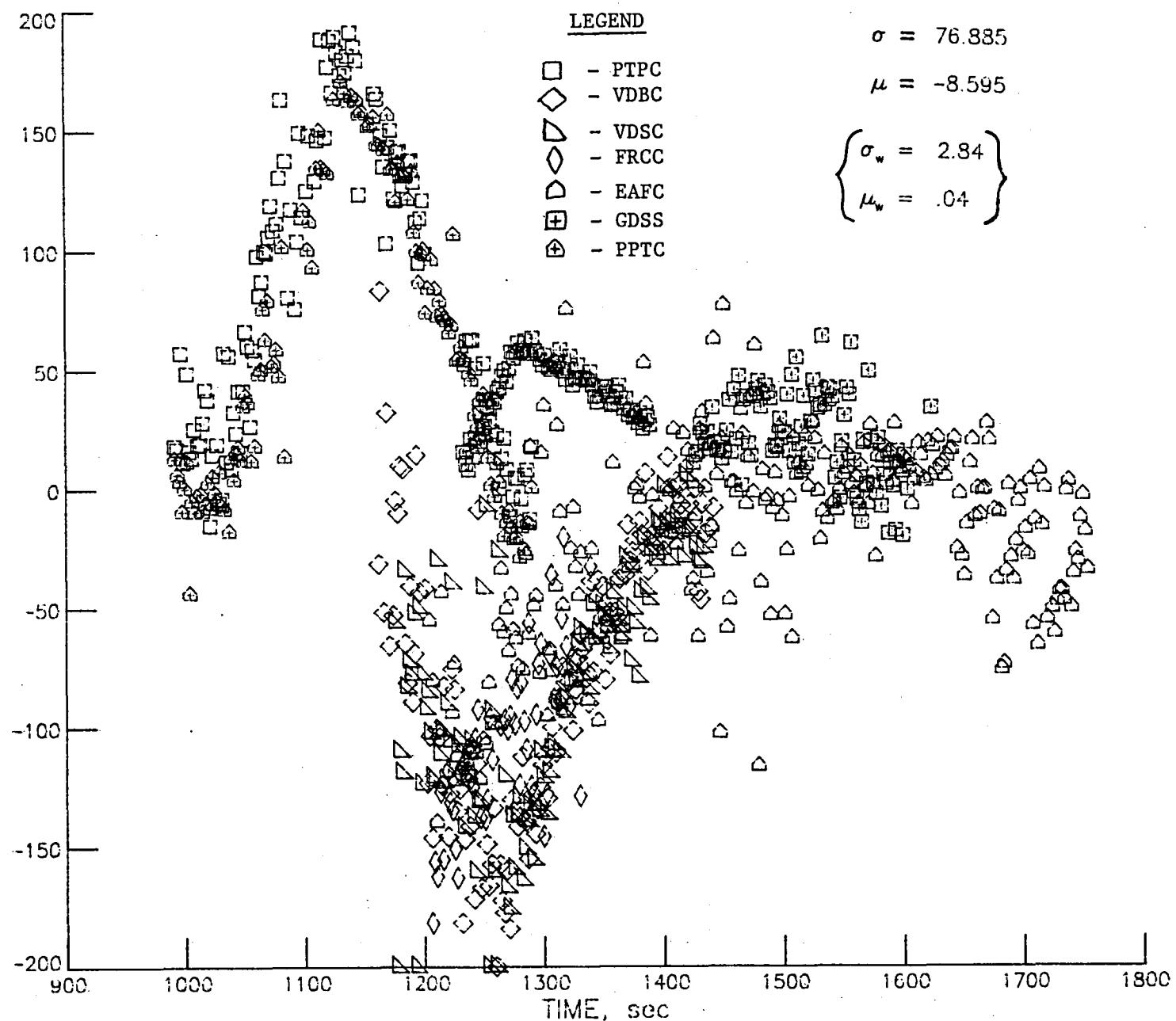


Figure I-4. STS-9 composite range residuals.

O-C, deg

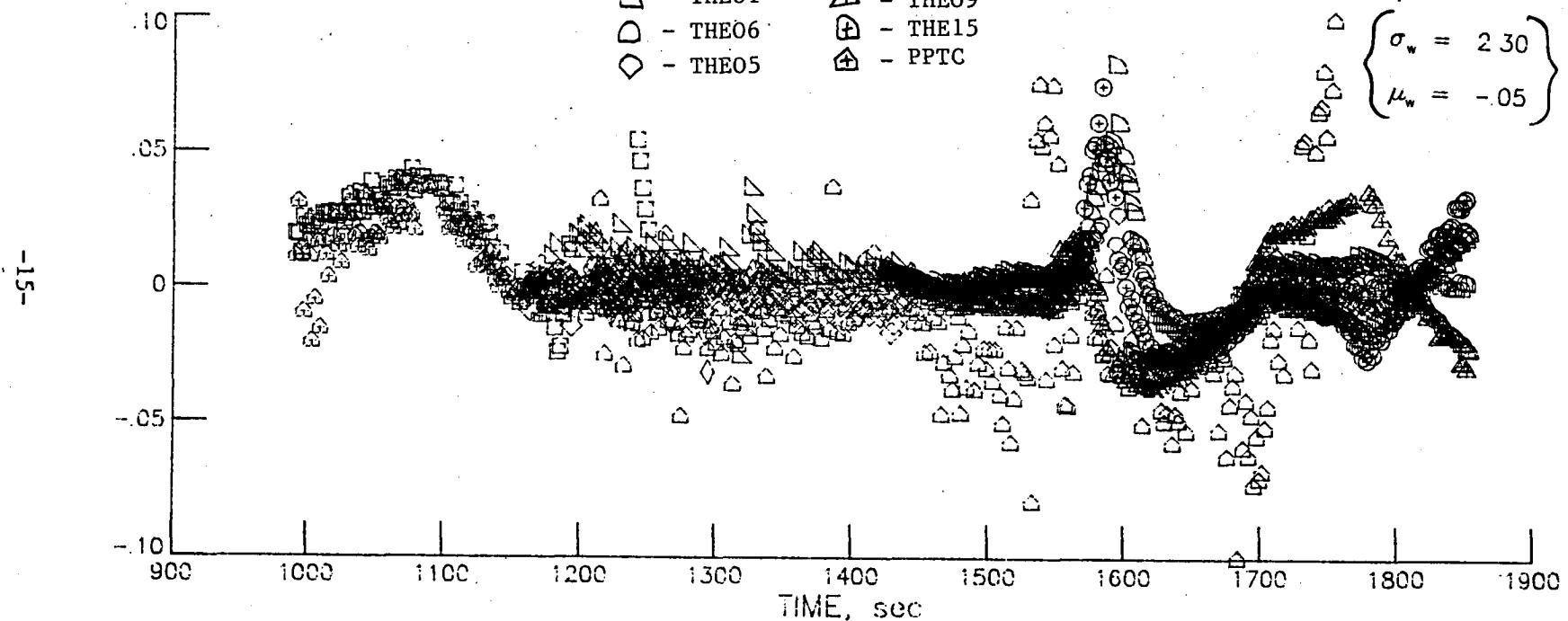


Figure I-5. STS-9 composite azimuth residuals.

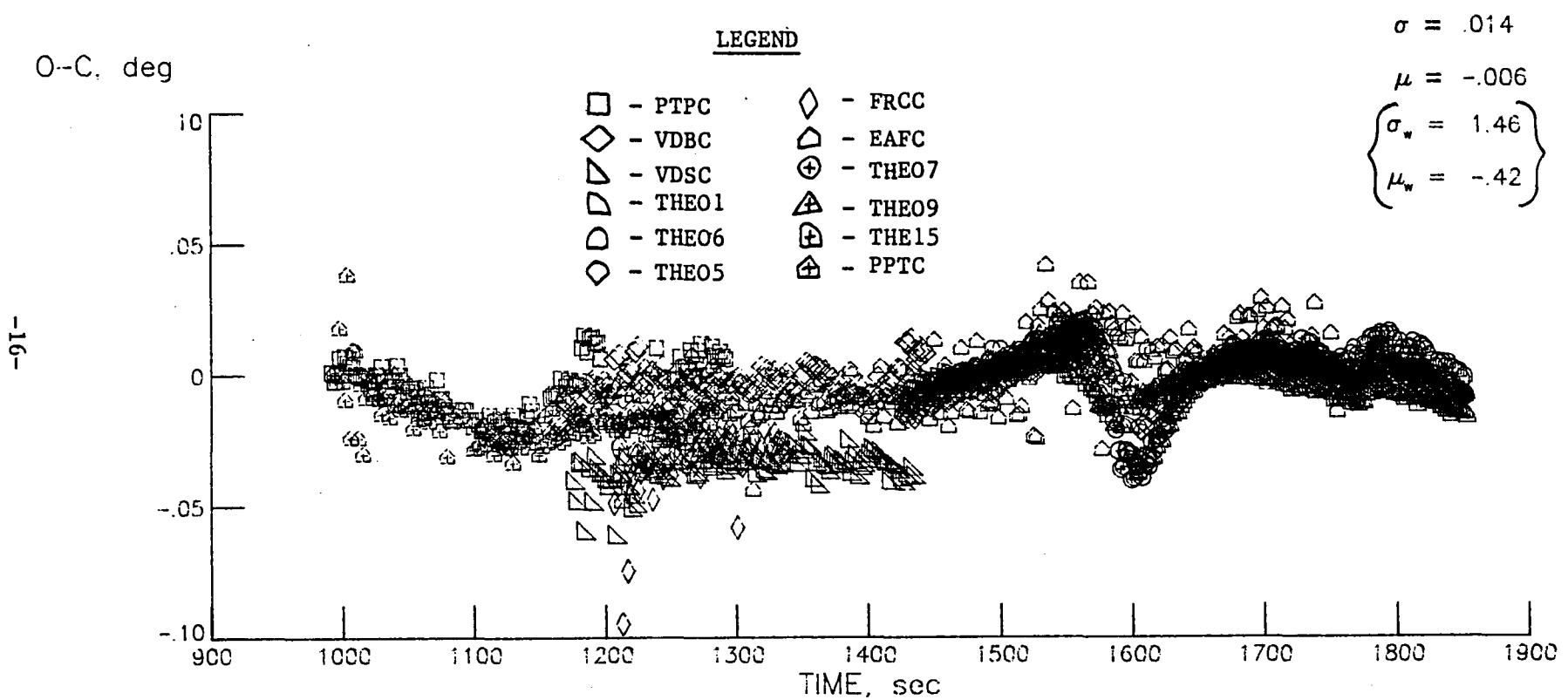
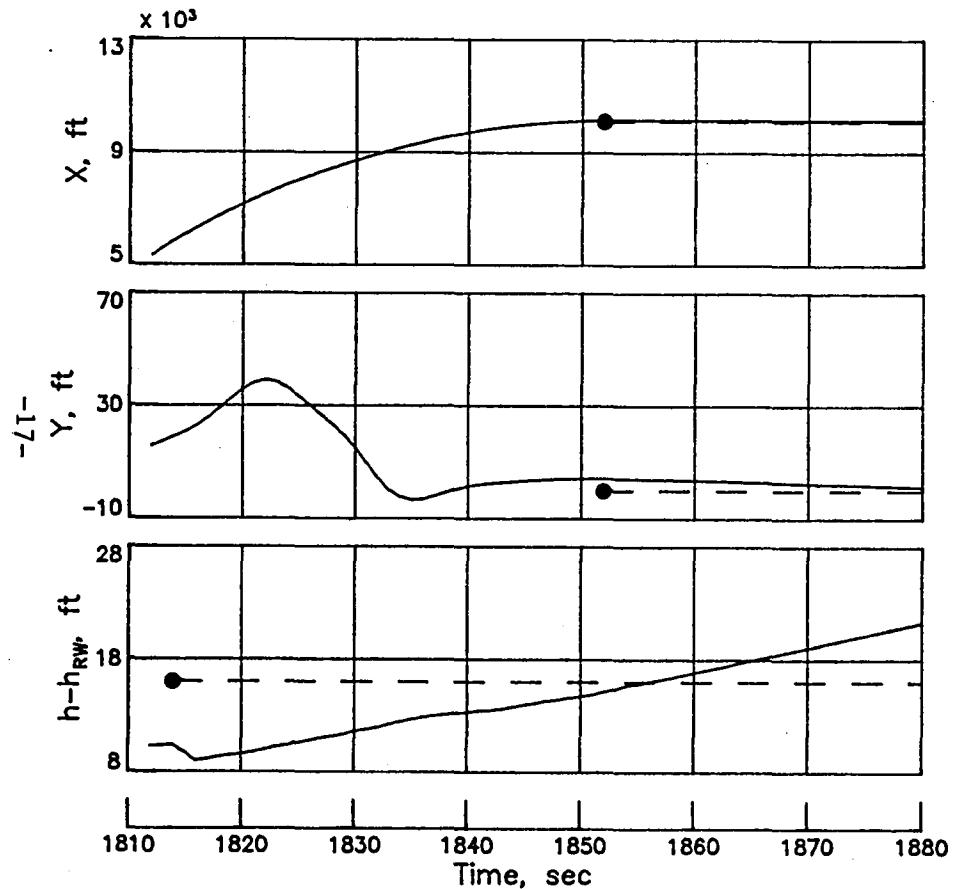


Figure I-6. STS-9 composite elevation residuals.

ROLLOUT POS. IN RUNWAY COORDS



ROLLOUT VEL. IN RUNWAY COORDS

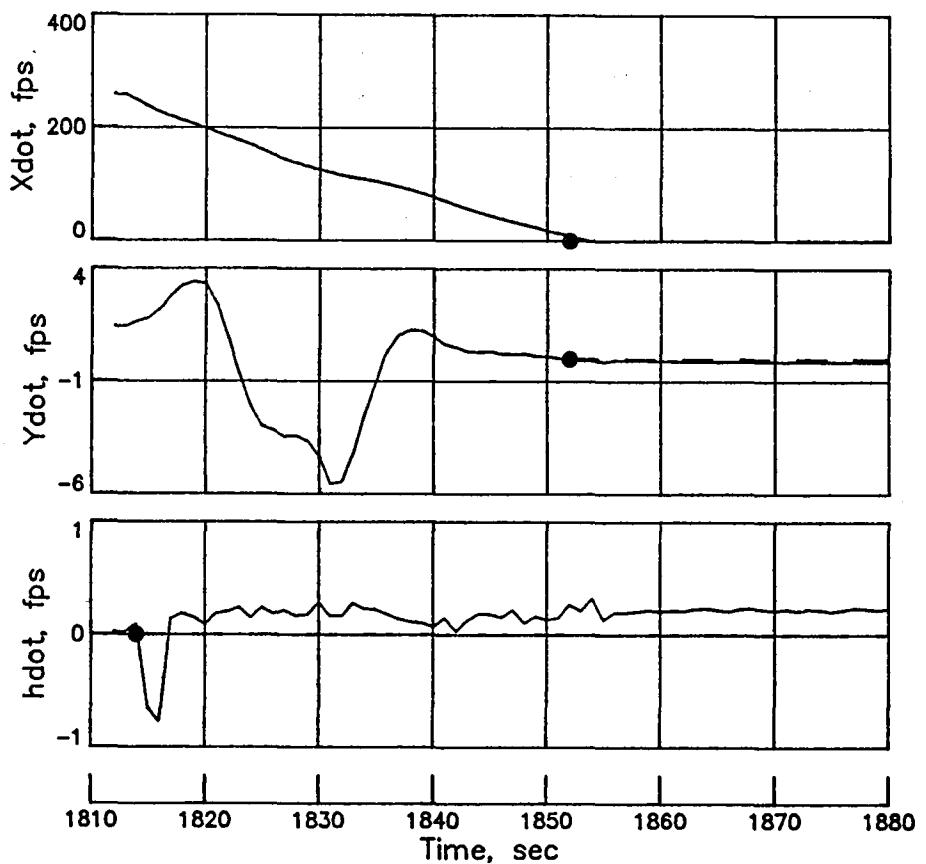


Figure I-7. Rollout position and velocity plots for STS-9.

II. Extended BET

Merging of the selected inertial reconstructed parameters (BET9J13) with the available atmospheric data to develop the Extended BET⁽¹⁾ is next discussed. Due largely to the STS-9 ground track, this task, as one might expect, becomes somewhat judgemental. The spacecraft was far removed from the usual remote rocket site governing the hypersonic regime of flight, namely, Barking Sands, Hawaii. Also, based on flight crew reports of a "sense of clear air turbulence at M23", followed by a space-craft pitch down to $\alpha \sim 37$ degrees, it was expected that density shears similar to STS-4 had been encountered. These facts, combined with the on-board navigation drag altitude update of ~ 10 kft that actually occurred for this flight, did indeed indicate an atmosphere encountered considerably different (much less dense) than on previous flights. Thus, the approach taken herein was to develop expected atmospheres, at least over the uppermost altitudes, and then compare all available measurement sources to try to best quantify the atmosphere. The measurement sources are the LAIRS data as well as the equivalent "totem pole" atmospheres (developed by the NWS - M. Gelman) extracted from the JSC/TRW BET. In the case of LAIRS, two files were generated for evaluation, STS9MET and STS9MEX. The two LAIRS files seemingly only differed in the break-point selection utilized in the fitting process. Both were based on merging two ROBIN sphere soundings from Barking Sands (and still were only able to utilize data up to 79 km) with a datasonde from Pt. Mugu, California (for $23 \text{ km} < h < 60 \text{ km}$) and the rawinsonde data from Edwards. The question then remains: "What is a reasonable expected atmosphere for such a flight?"

Over the uppermost altitudes, $150 \text{ kft} < h < 300 \text{ kft}$, two sources of expected atmospheres were utilized. First, as has been done in the past, density can be derived from the in situ IMU accelerometer measurements. Use of the predicted normal force coefficient, C_{N_p} , and the normal acceleration yields:

$$\rho C_N = \frac{2 \text{ m } A_N}{C_{N_p} \text{ S } V^2}$$

⁽¹⁾ See AMA Report No. 81-11 for file contents.

Use of this derived density in the hydrostatic equation ($dp = -\rho C_N g dh$) yields, when integrated, the pressure at altitude from which, using the perfect gas law, temperature can be derived. Obviously, any biases in the predicted aerodynamic coefficients reflect as shifts in the atmospheric parameters so derived. One could offset the $C_N p$ based on previous Shuttle results to improve on the derived ρ but that was not done here.

The second source utilized for an expected STS-9 atmosphere was the Air Force 1978 Reference Atmospheres.⁽²⁾ This model, unlike simpler standard versions such as the 1962 and 1976 models, provides for latitudinal and seasonal variations. For the purposes herein this is very important in view of the fact that the spacecraft ground track varied from $\sim 60^\circ\text{N}$ to $\sim 30^\circ\text{N}$, and the expected variation is even more pronounced given the December flight data. Readers are reminded that, though the model is functionally proper, there is (not unexpectedly) a day to day variability with altitude, latitude, and season which can be appreciable. Also, no predictable diurnal or semi-diurnal corrections are modelled.

Figures II-1 and II-2 show the expected density and temperature profiles over the uppermost altitude region, $150 \text{ kft} < h < 300 \text{ kft}$, respectively. The density plot, scaled to the 1962 Standard, shows a shaded region for the C_N derived density. The left boundary (least dense) is based on the selected inertial BET (BET9J13). The right hand side is based on the alternate state (BET9F01). The spread shown reflects the different altitudes for the two trajectory reconstructions. Though not appreciably different below 230 kft, it is observed that the implied differences in ρC_N due to state are from 5 to 10 percent as altitude increases to ~ 300 kft. This does in fact imply an accuracy limitation on any flight/data base comparisons to be made above 230 kft. Clearly, independent of state, density shear structure is quite apparent e.g., an almost fifteen(15) percent jump increase is seen at $h \sim 233$ kft. Shown also thereon, as the dashed line, is the AF78 density profile interpolated to Columbia latitude and altitude. For information, density contours at

⁽²⁾ Cole, A. E. and Kantor, A. J., Air Force Reference Atmospheres, AFGL-TR-78-0051, Air Force Surveys in Geophysics, No. 382, 28 Feb., 1978.

three fixed Northerly latitudes are displayed. It is of interest to note that the large density wave suggested in the C_N derived density is reasonably well predicted by the latitudinal dependence of the model. The expected temperature profiles of Figure II-2 show the derived temperature (using ρ_{C_N} based on BET9J13), the AF78 profile, and two fixed latitude contours for information.

Measured density and temperature profiles in the same altitude interval are next presented. Figure II-3 shows the density profiles based on the NOAA "totem-poles" and two LAIRS files as indicated. Also re-plotted thereon are the ρ_{C_N} (BET9J13) and AF78 model to provide direct comparisons. Similarly, temperature profiles are shown as Figure II-4. Some obvious observations one can make are the following:

- The NOAA density profile and AF78 atmosphere are nearly identical for $150 \text{ kft} < h < 190 \text{ kft}$ and again for $h > 275 \text{ kft}$. However, for altitudes of $190 \text{ kft} < h < 275 \text{ kft}$ the NOAA profile appears to be too dense, at least supported by the fact that both LAIRS profiles and the AF78 density are in general accord throughout much of this interval.
- Both LAIRS density profiles and the AF78 density are virtually identical for $210 \text{ kft} < h < 230 \text{ kft}$ and follow therein the C_N derived results apart from the shear structure sensible in the accelerometry data. Above 230 kft, until altitudes of 250 kft (STS9MEX) and 260 kft (STS9MET), each LAIRS profile continues to support the C_N derived ρ . At these respective benchmark altitudes, both LAIRS files show density profiles drastically increasing in nature and, as a consequence, unbelievable. Similarly, though at lower altitudes ($h \sim 210 \text{ kft}$), rapidly increasing temperature profiles are seen in the LAIRS data. The temperature for STS9MET increases almost without bound. The temperature for STS9MEX does approach an isotherm at $h \sim 250 \text{ kft}$.
- Both LAIRS files in general exhibit structure more "functional" in nature for STS-9 than on previous flights due apparently to the data fitting process given the limited data.

and, finally;

- Despite the fact that the AF78 model does not reflect day-to-day variability it does seem to provide a "best-fit" to all the measured sources available and, in terms of general curvature, follows the C_N derived results.

Thus, the AF78 model data were adopted for this altitude interval. Similarly, the measured density and temperature sources below 150 kft were investigated. Figures II-5 and II-6 show the density and temperature data, respectively. Shown also thereon are the AF78 data. At these lower altitudes the spacecraft is in the near vicinity of Pt. Mugu, California and it is expected that thermistor soundings from that site, as well as the rawinsonde data from Edwards Air Force Base, would be more applicable. Inspection of these two figures leads one to the choice of 140 kft as a cross-over point to transfer from the model to the measurements. Thereafter neither LAIRS file nor the NOAA data differ by more than five(5) percent.

The previous atmospheric selection process, a somewhat arbitrary assessment, was concerned principally with the choice of ambient atmospheric conditions. Winds were also evaluated. At the upper altitudes during supersonic and hypersonic flight the winds from the NOAA file were adopted. Surprisingly, some few percent effect from these winds at $M \sim 9$ were evident such that they could not be neglected. The LAIRS winds generally agreed with the NOAA data up to about 200 kft ($M \sim 18$) and thereafter appeared shifted. Shifting out the abrupt change yielded winds very nearly the same as the NOAA data above this altitude as well.

Subsonic winds were evaluated using alternate wind measurements obtained from three jimsphere balloons deployed over a four hour interval about landing. Winds obtained from the Landing + 15 minute balloon (B3) were very erratic for $h > 30$ kft. Dave Richardson of AFFTC recommended that B3 data be used for $h < 25$ ft and that the Landing - 1½ hour balloon (B2) data be used for $h > 25$ kft. Figure II-7 shows the measured winds from each of the jimsphere balloons, together with rawinsonde winds from LAIRS and the NOAA winds obtained via the JSC/TRW BET. The erratic nature of the jimsphere B3 winds for $h > 30$ kft is very evident. They are in fact

multi-valued with altitude. In general there is good agreement among LAIRS, NOAA and the B3 winds for $h < 25$ kft. NOAA winds appear to be B3 winds below 30 kft with a switchover to rawinsonde winds above 30 kft. The agreement among LAIRS, NOAA and the B2 balloon data for $h > 30$ kft is shown more clearly in Figure II-8 where "composite" jimsphere winds are shown together with LAIRS and NOAA data. The composite jimsphere winds were generated by combining B3 and B2 data, with the point of smooth transition from B3 to B2 set at $h = 28.6$ kft. Since the NOAA subsonic winds were in good agreement with the "recommended" jimsphere winds, the NOAA data were utilized on the extended BET.

The final atmosphere for this flight, developed as discussed, is FLAIR9/UN=581199C. Again, the choice was very judgemental requiring mixing of model data with remote sensed information. Before proceeding to the AEROBET discussion in Section III it is instructive to show how each of the previously discussed atmospheres affect the flight/data base comparison. This is shown in Figure II-9 in terms of ΔC_N versus Mach number, a simple recasting of the density differences previously shown. Results using each of the atmospheres previously discussed are as annotated thereon to provide for (a rather grim) error analysis. The shaded region shown thereon is the statistical spread determined from the previous five(5) Columbia flights. Also shown as the lower sub-figure is the STS-9 body flap deflection versus Mach. Superimposed on this figure is the range of values previously flown on the earlier eight(8) flights. The body flap history is drastically different in the hypersonic regime as seen. Though there is apparent need for refined body flap effectiveness, one should not construe this difference as the total concern for this flight. For example, predictably the body flap should only reduce the normal force by ~3-5 percent hypersonically in the full-up position. Though an atmosphere has been selected, the variability shown for the various potential atmospheres is considerable and renders STS-9 flight data questionable for body flap effectiveness studies over much of the Mach region. It is noted that the results using STS9MEX do provide for a smaller (on average) flight/data base difference, principally due to the suggested underprediction centered around M18. This is due to the different cubic fit for the changed break point altitude

which can be seen by referring back to Figure II-3 at $h \sim 200$ kft. Thereon it is also observed that, throughout the interval $150 \text{ kft} < h < 200 \text{ kft}$, the STS9MEX density is the outlier from the other sources.

The final figures presented in this Section are the FLAIR9 atmospheric parameters. Figure II-10 shows the temperature profile versus altitude. Density and pressure are plotted versus altitude as Figures II-11 and II-12, respectively. Finally, the winds versus altitude are given as Figure II-13.

h , kft

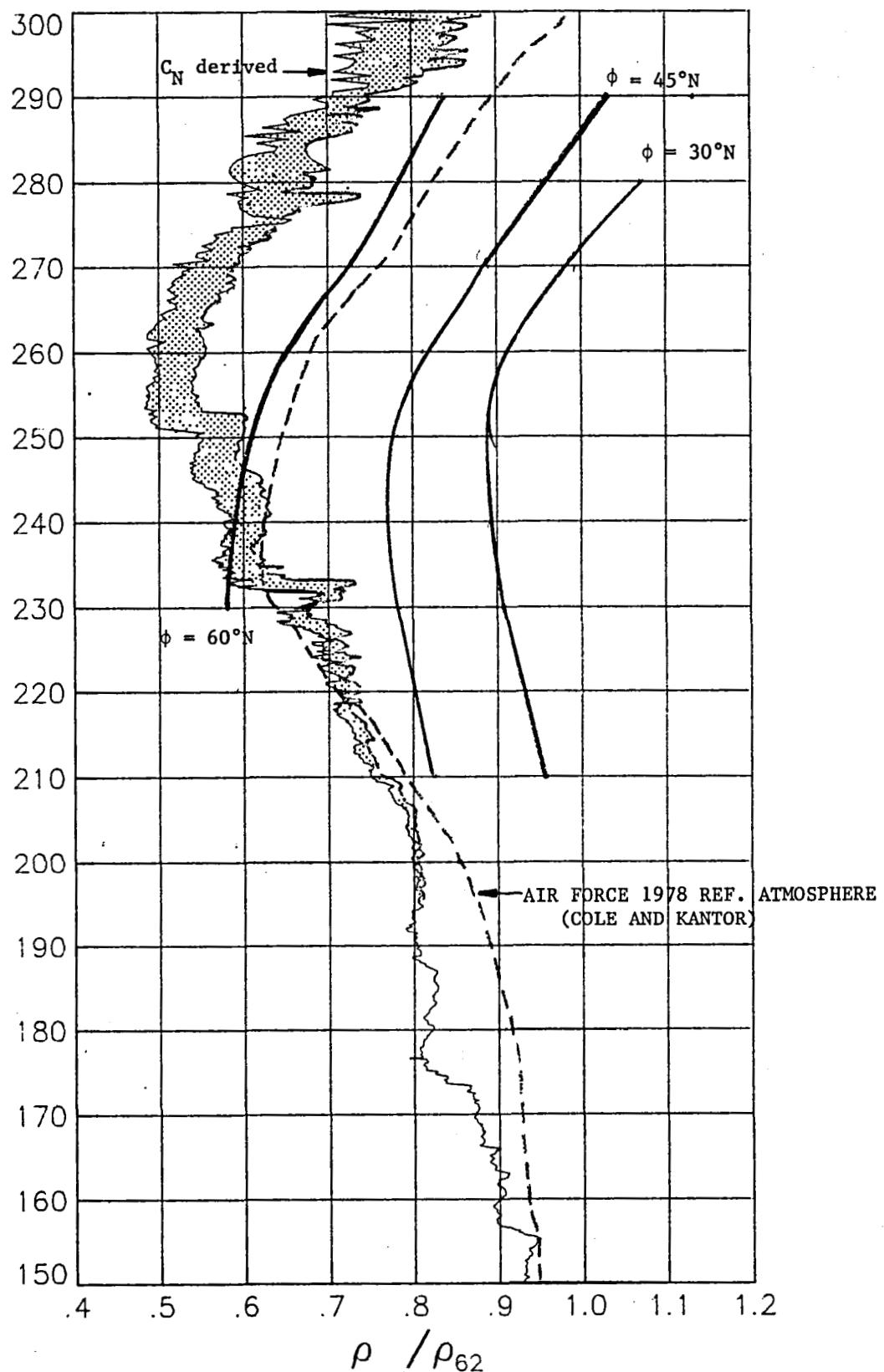


Figure II-1 Expected upper atmosphere density profiles based on accelerometry and latitudinal/seasonal dependent model.

h , kft

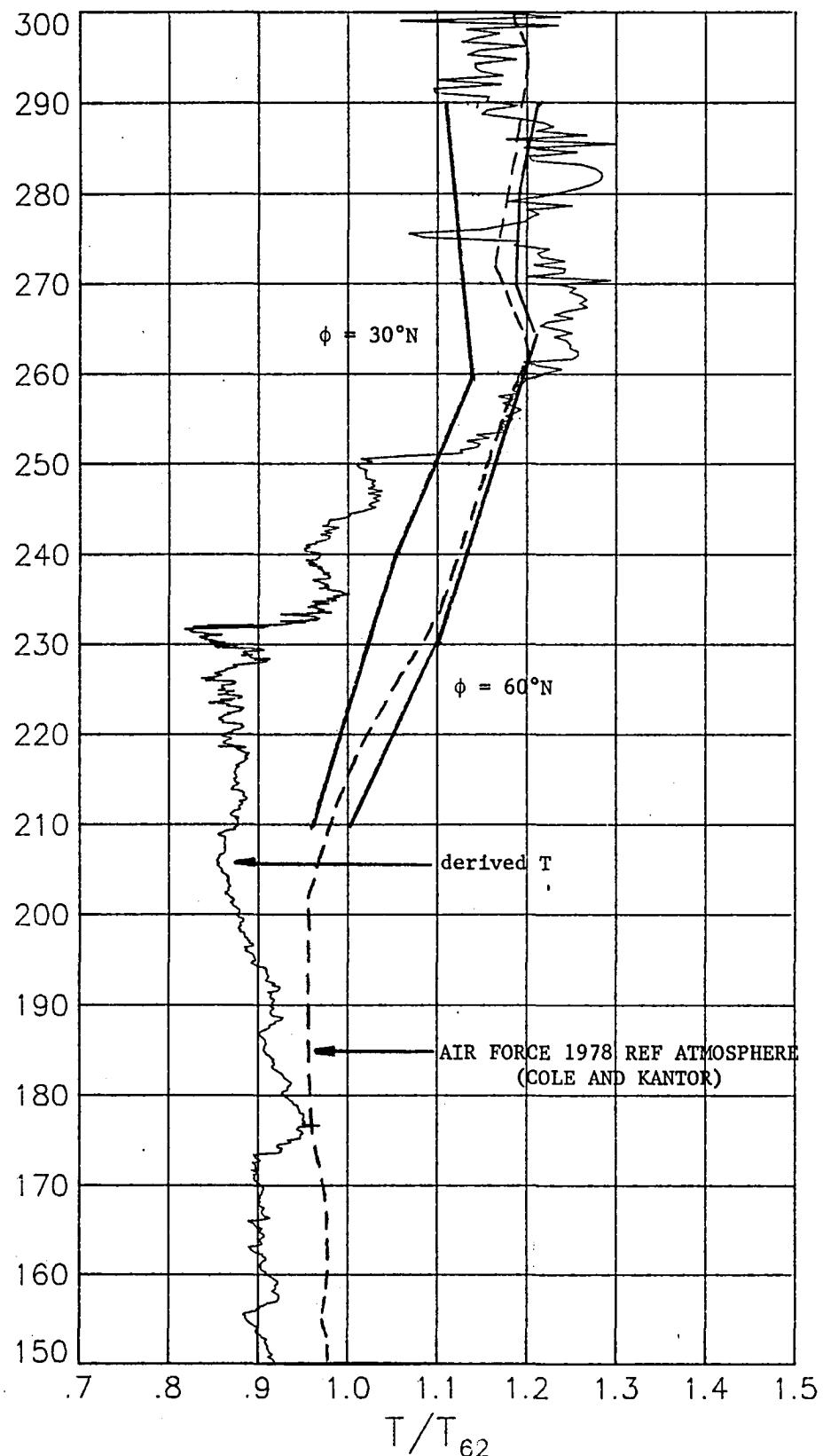


Figure II-2 Expected upper altitude temperature profile based on accelerometry, hydrostatic equation and gas laws as well as latitudinal/seasonal dependent model.

h , kft

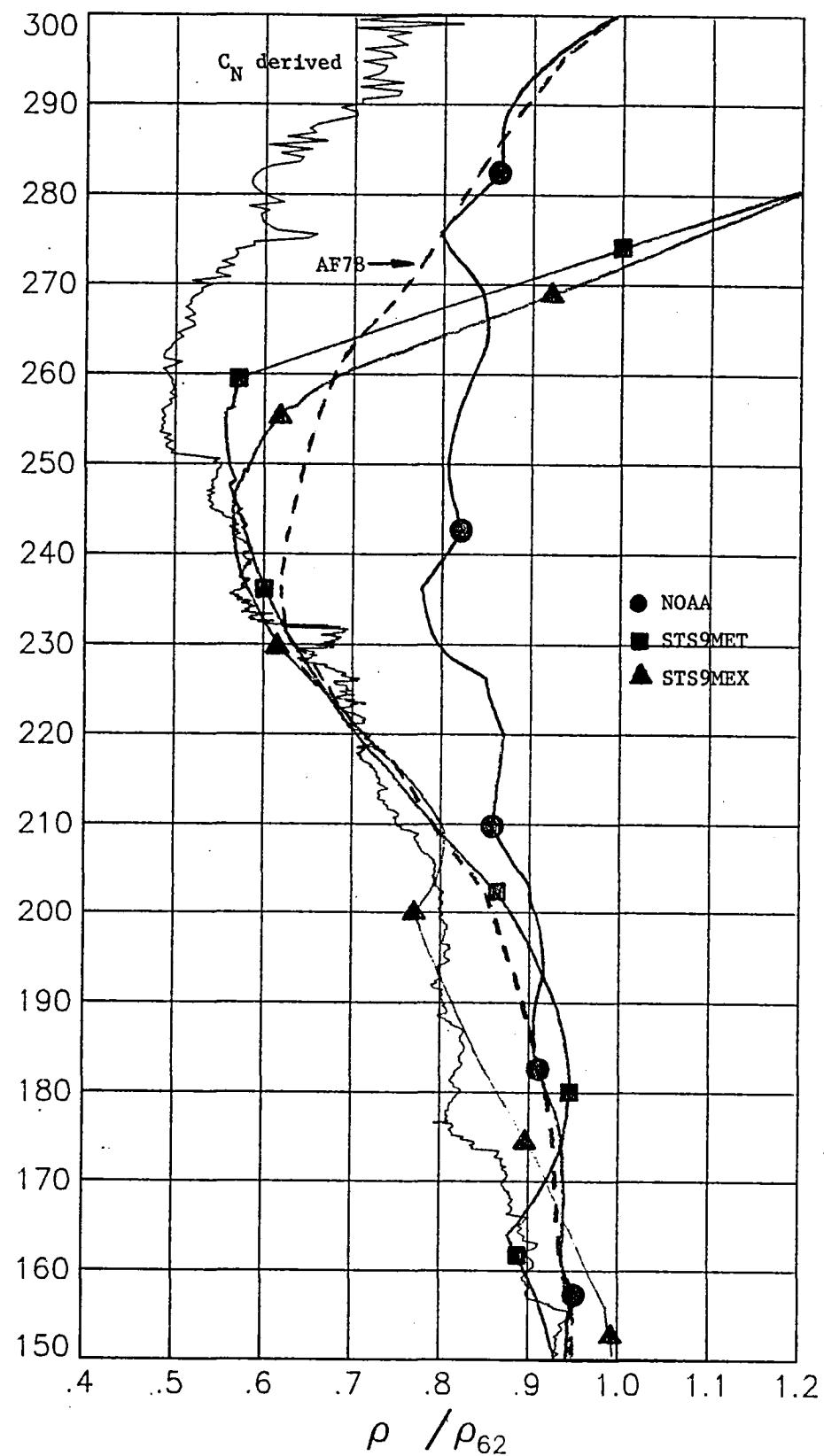


Figure II-3. Upper altitude source density comparisons.

h , kft

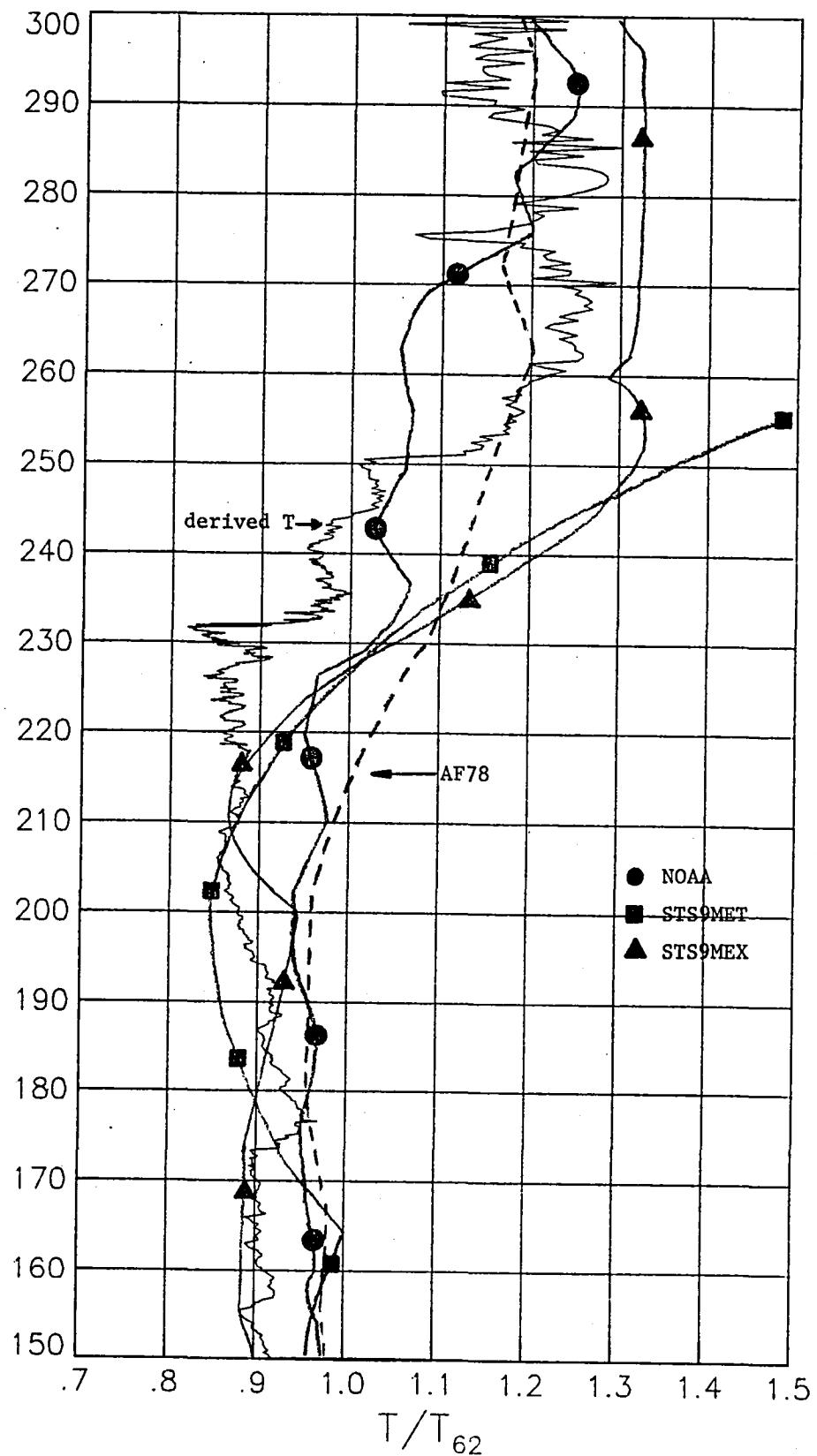


Figure II-4 Upper altitude source temperature comparisons. -27-

h , kft

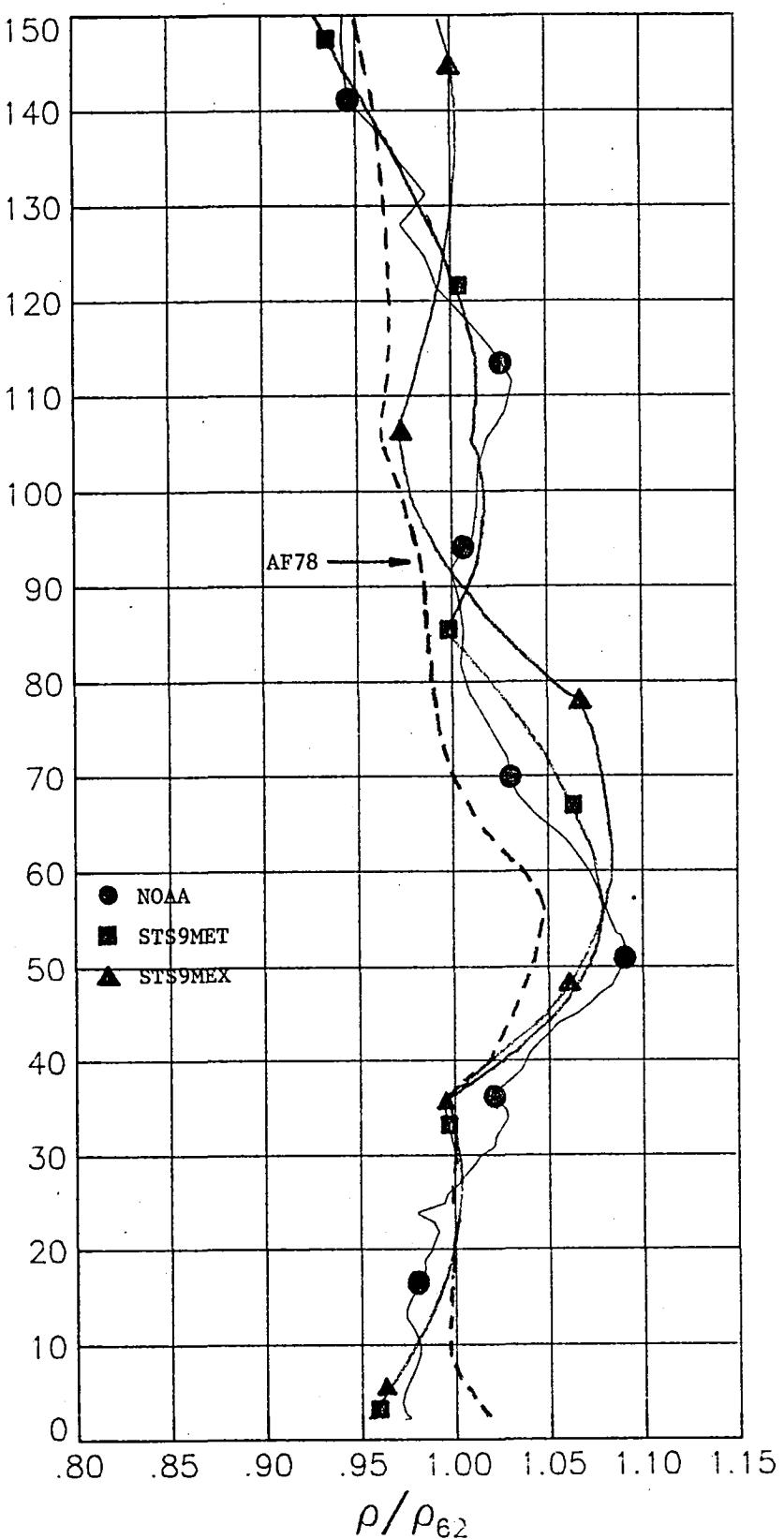


Figure II-5 Lower altitude source density comparisons.

h , kft

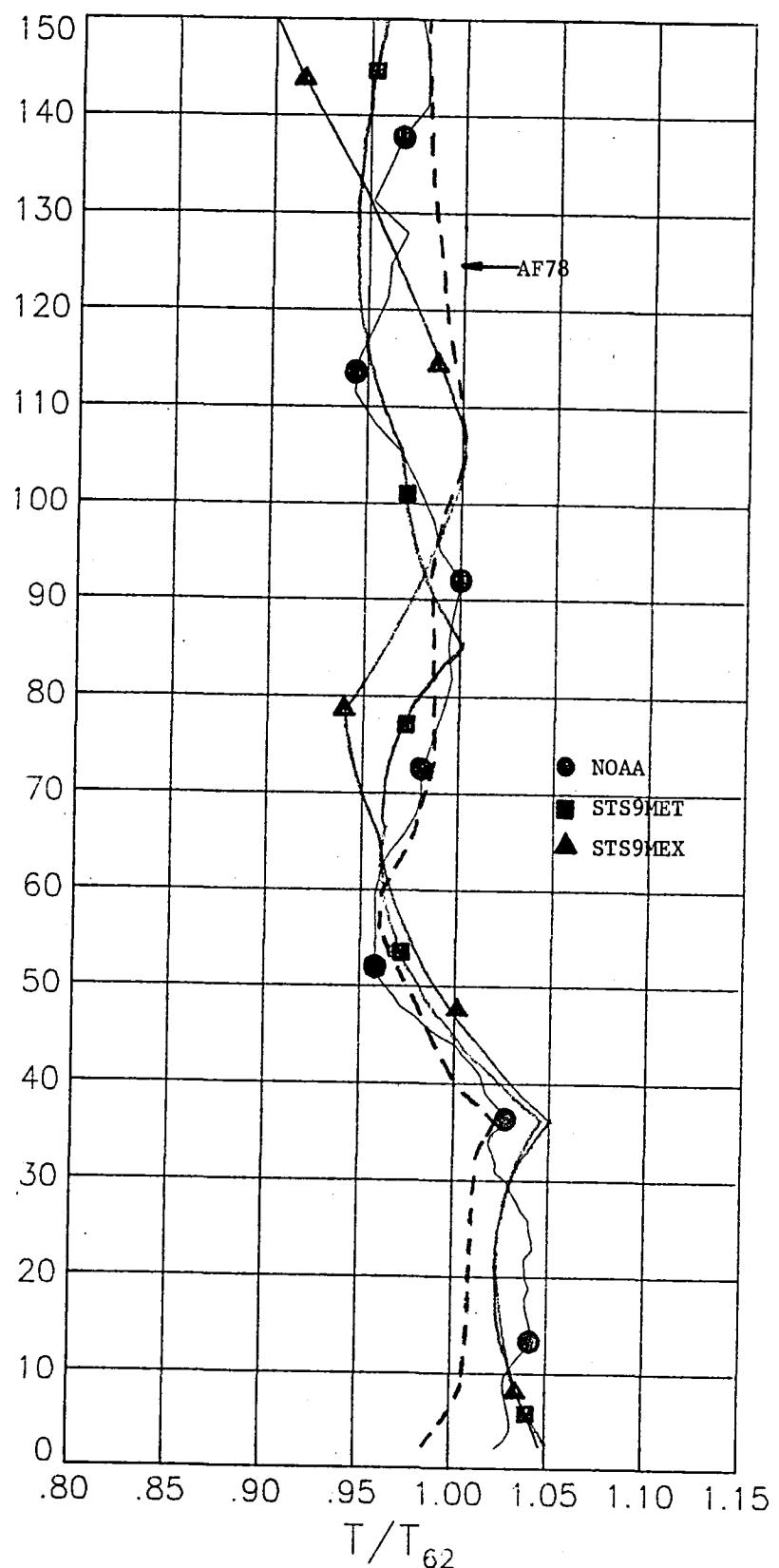
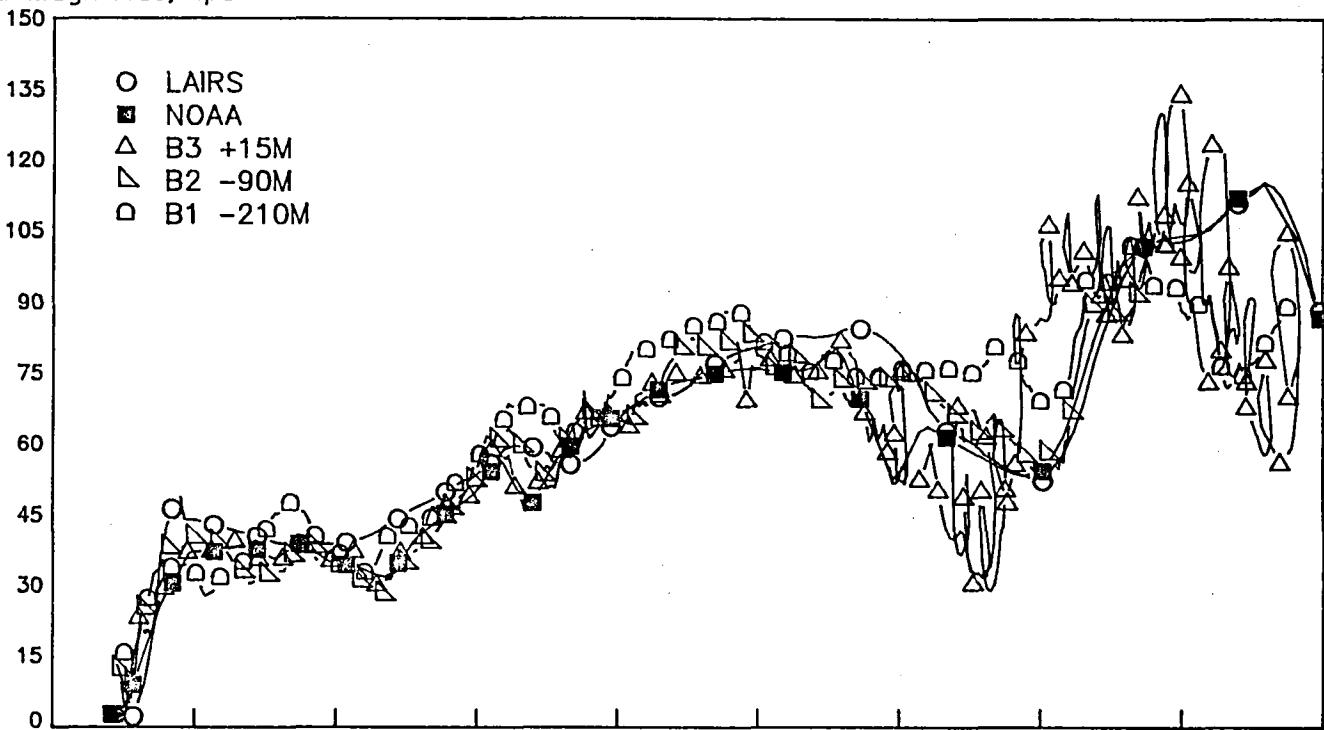


Figure II-6 Lower altitude source temperature comparisons.

Wind Magnitude, fps



Wind Direction, deg

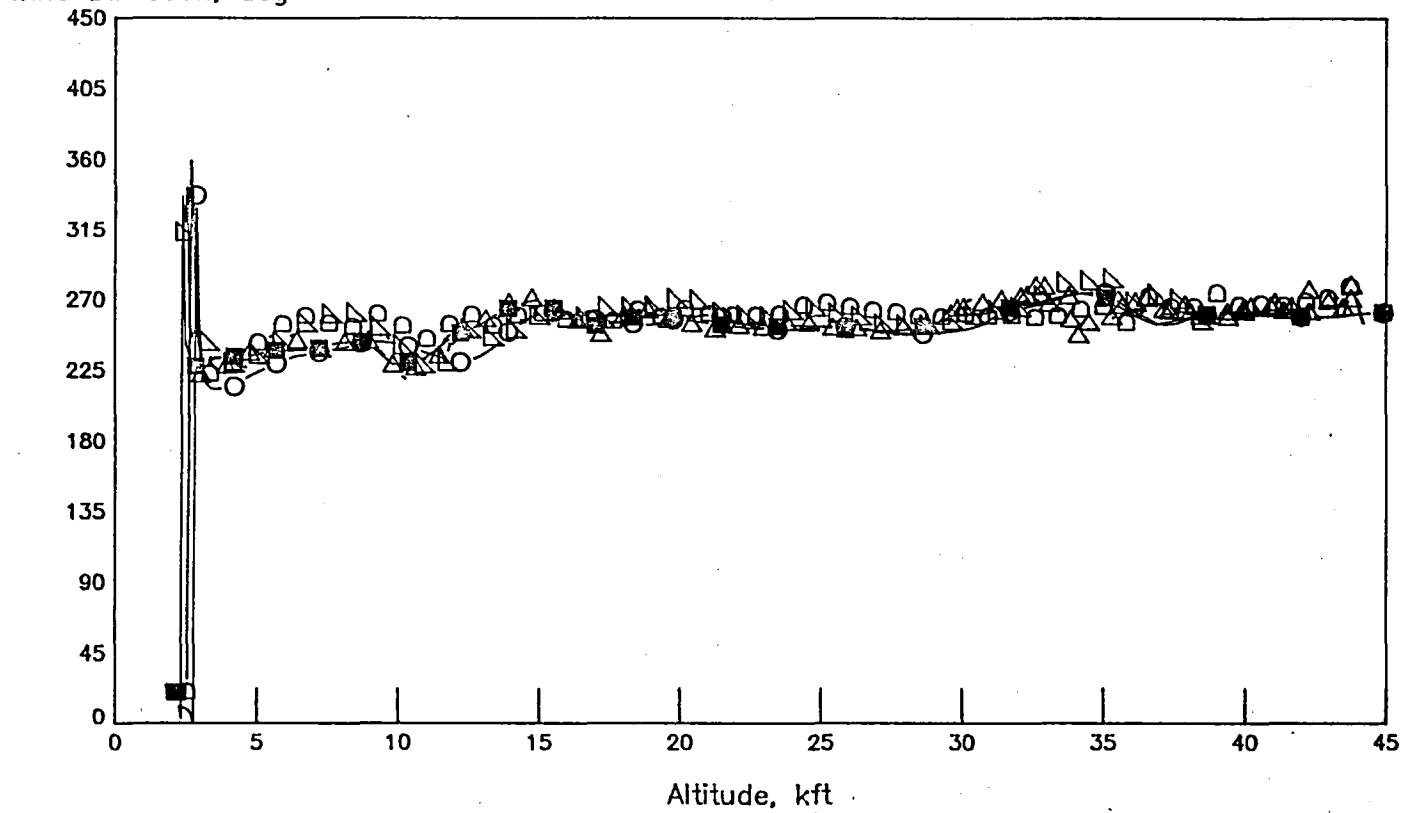
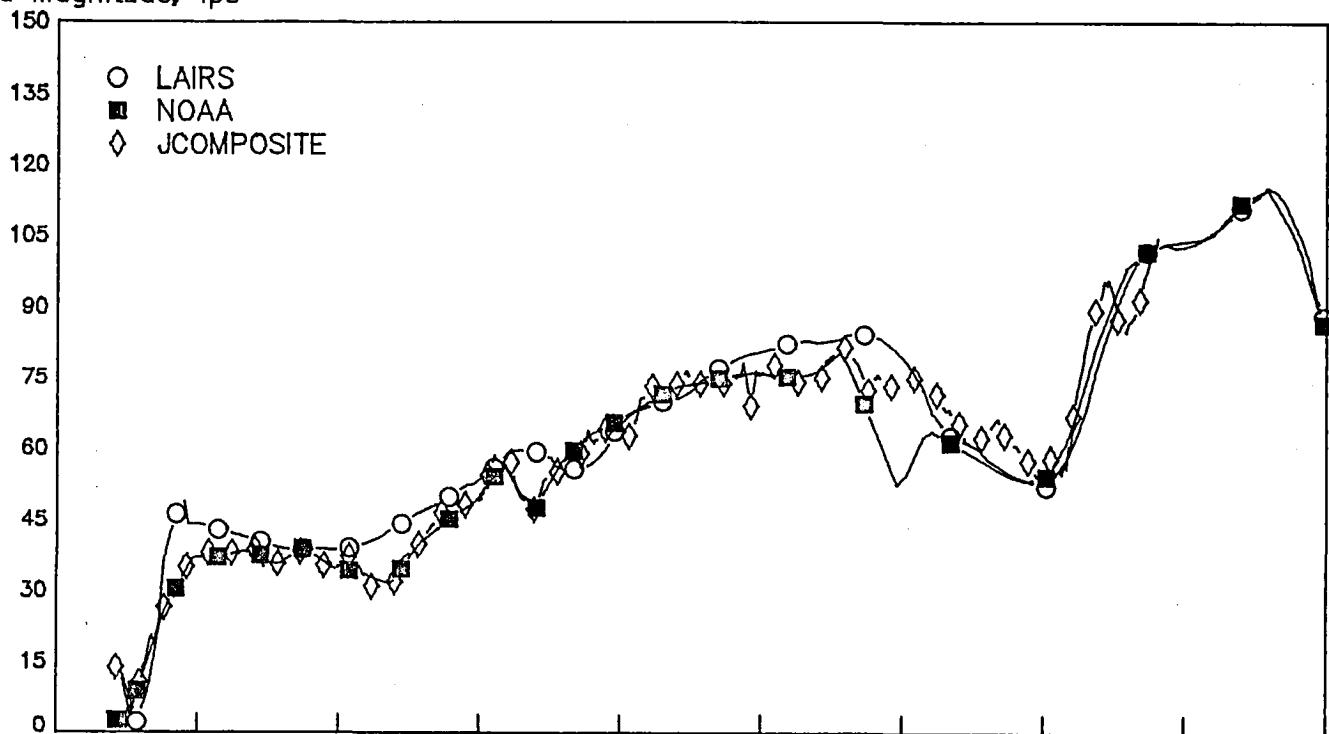


Fig.II-7.STS-9 Measured Winds (LAIRS,NOAA,JIMSPHERE)

Wind Magnitude, fps



Wind Direction, deg

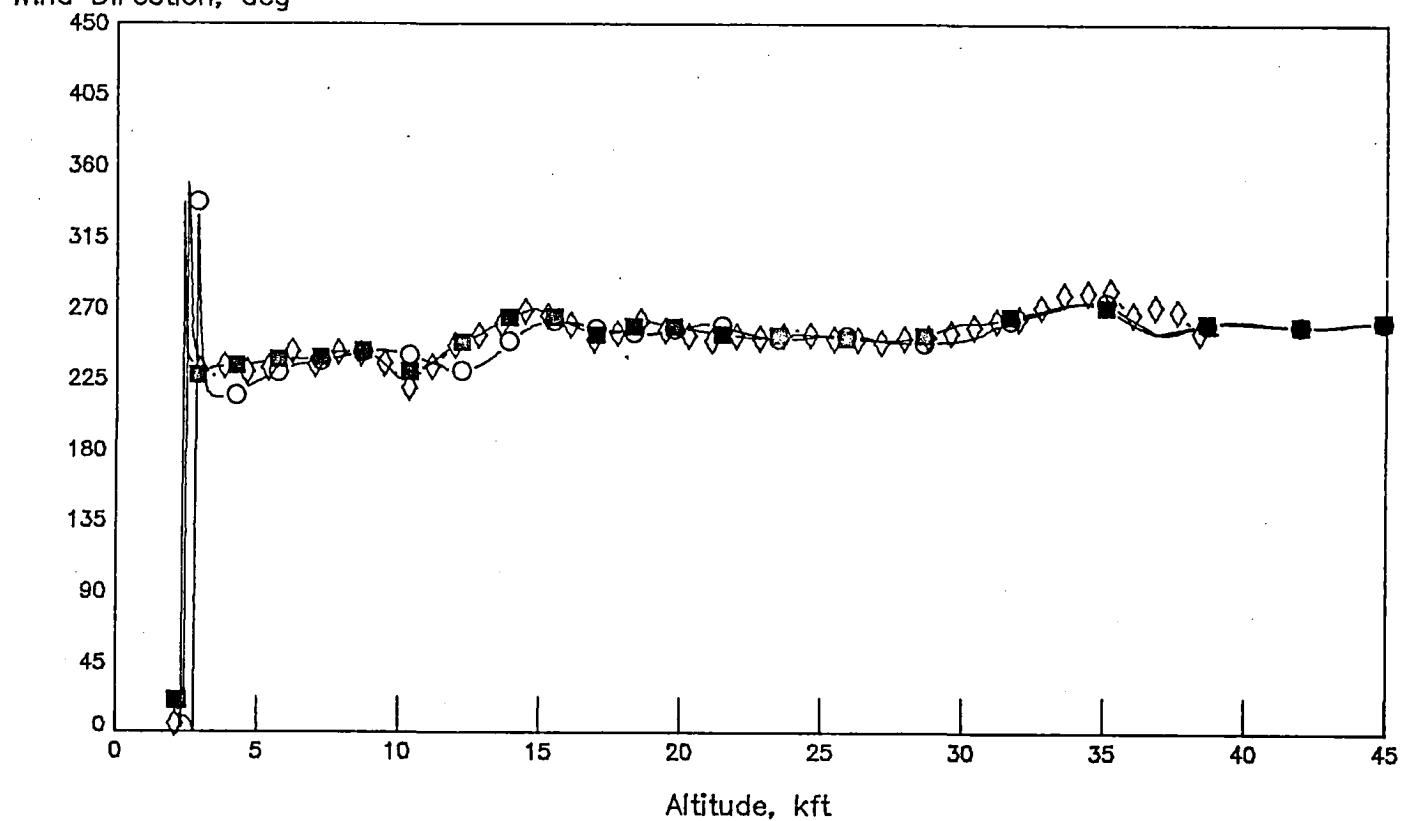
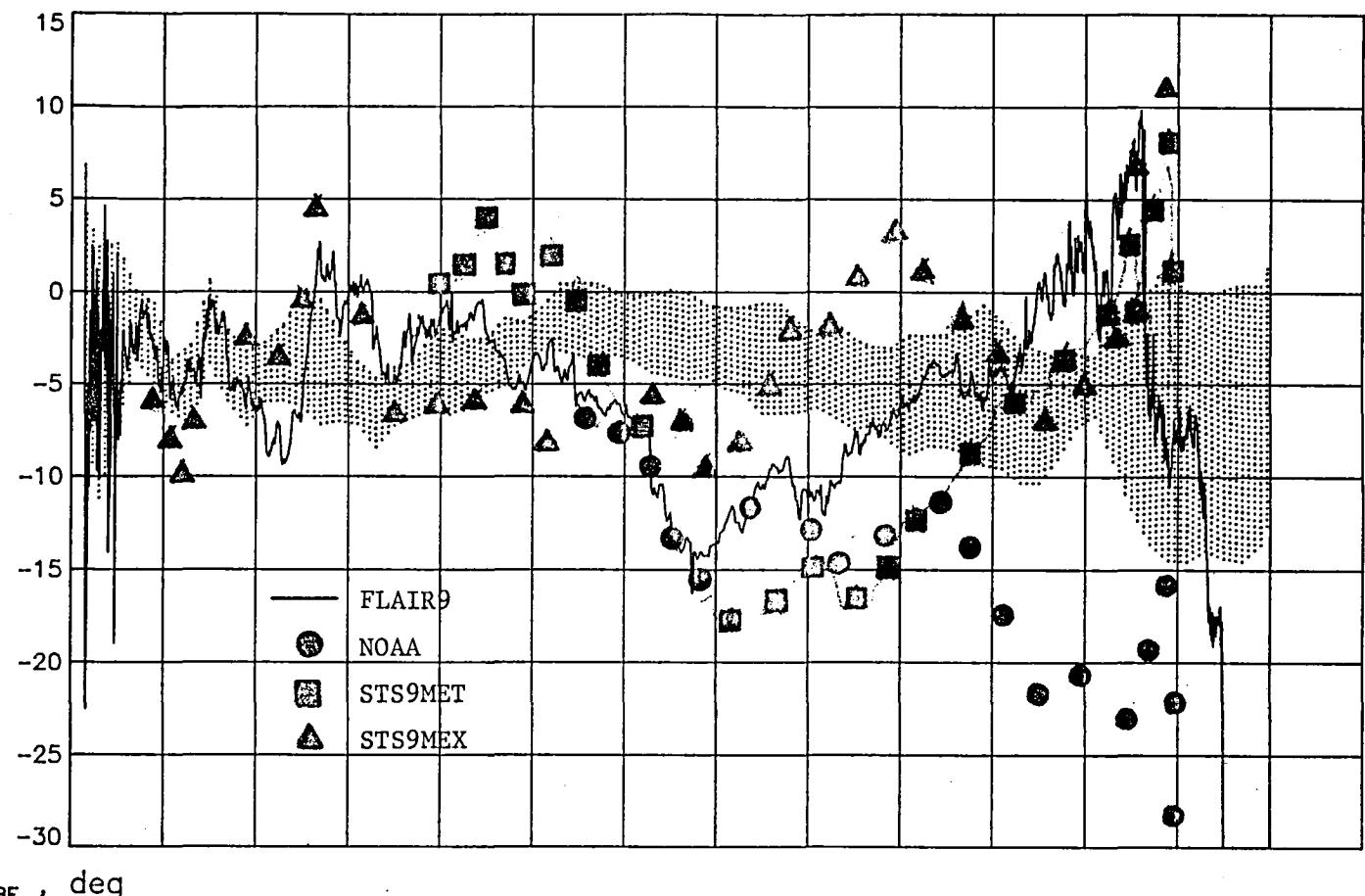


Fig.II-8.STS-9 Measured Winds (LAIRS,NOAA,JCOMPOSITE)

ΔC_N , percent



δ_{BF} , deg

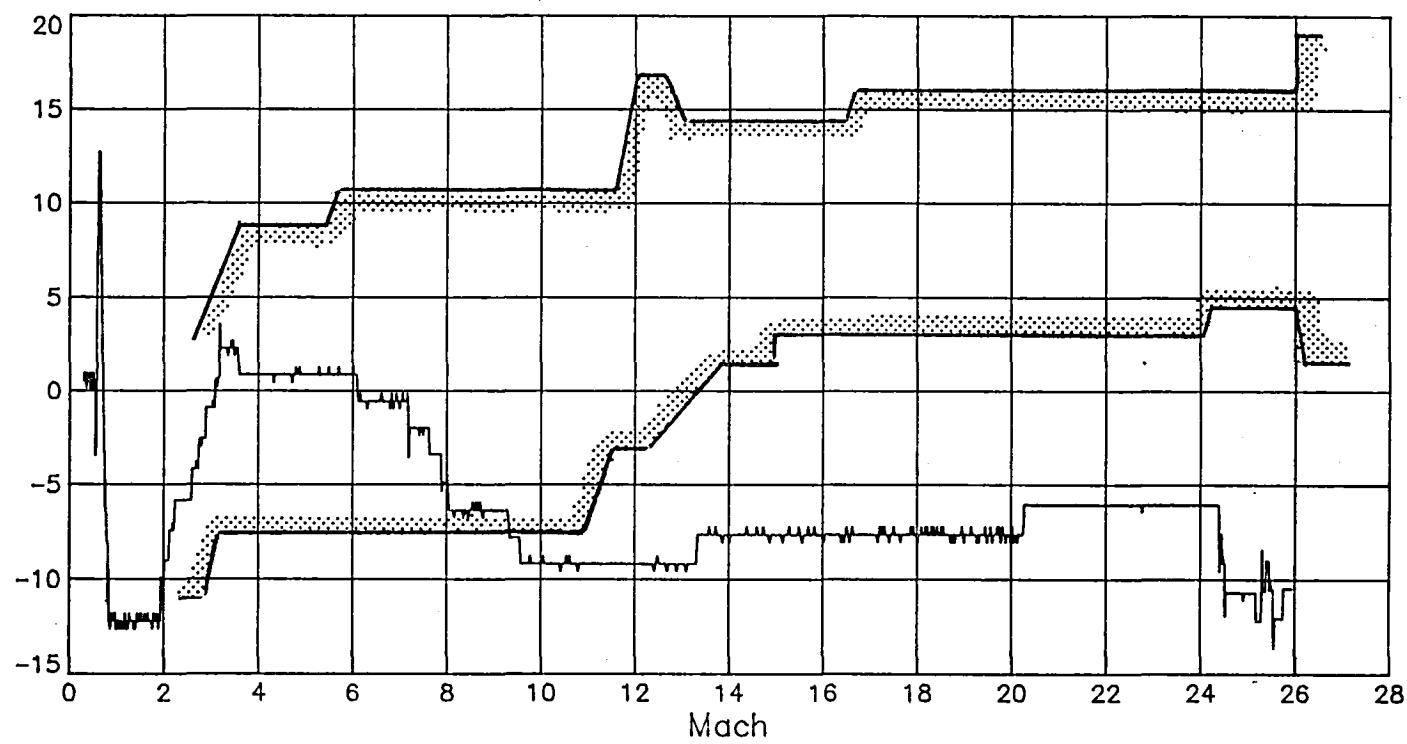


Figure II-9 ΔC_N for various atmospheres and body flap comparisons versus Mach No.

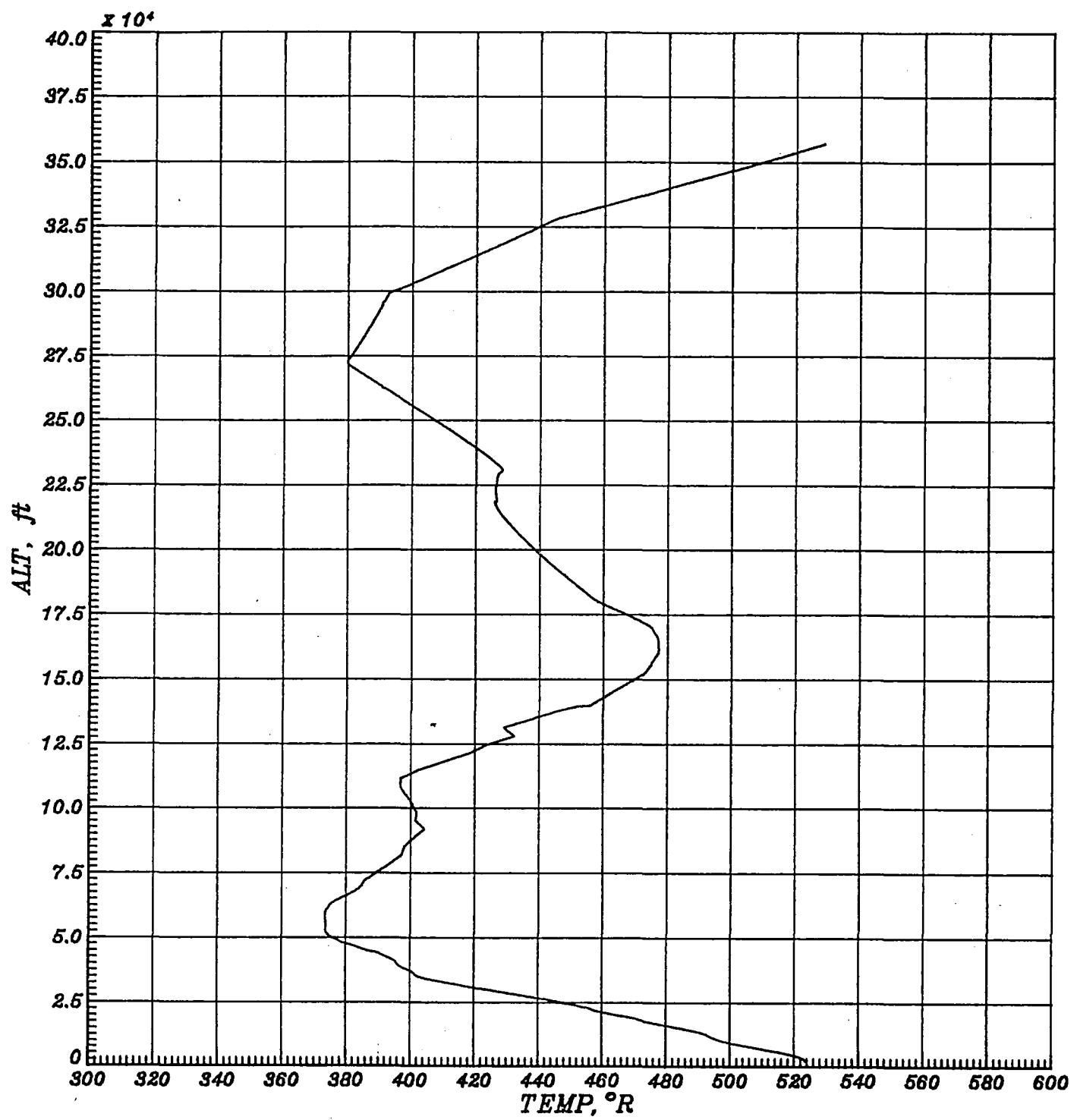


Figure II-10 STS-9 temperature-altitude profile

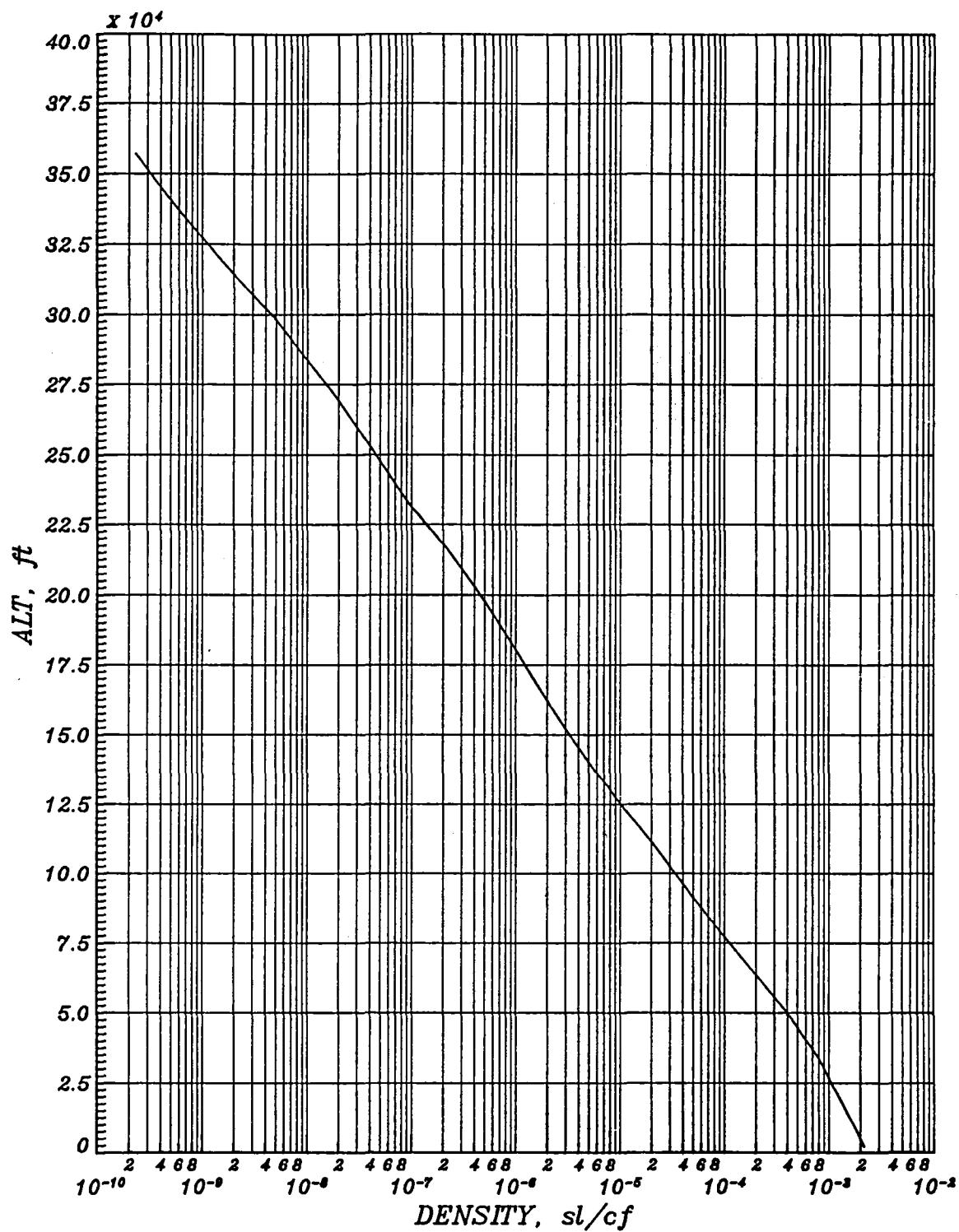


Figure II-11 STS-9 density profile with altitude

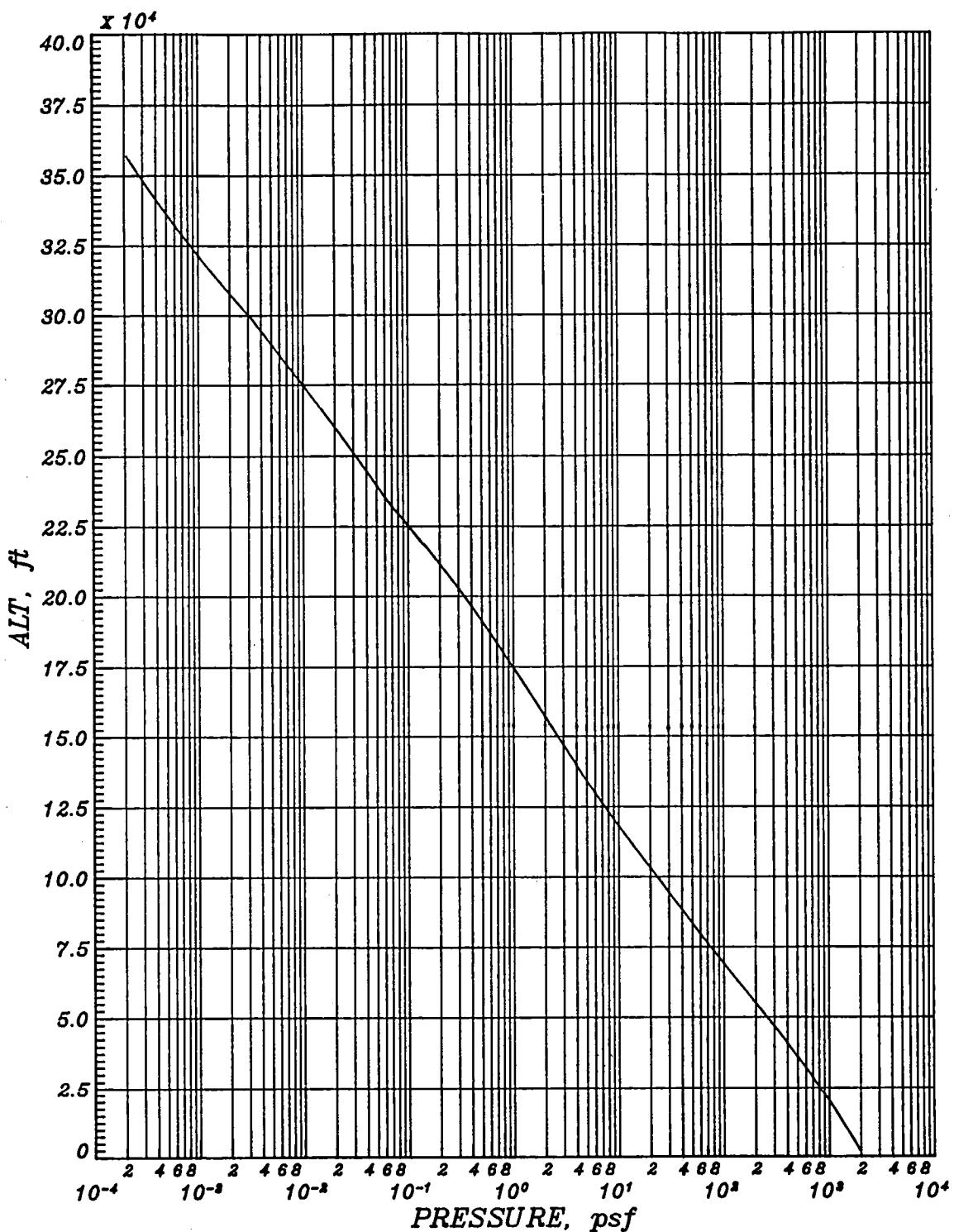


Figure II-12 STS-9 pressure versus altitude.

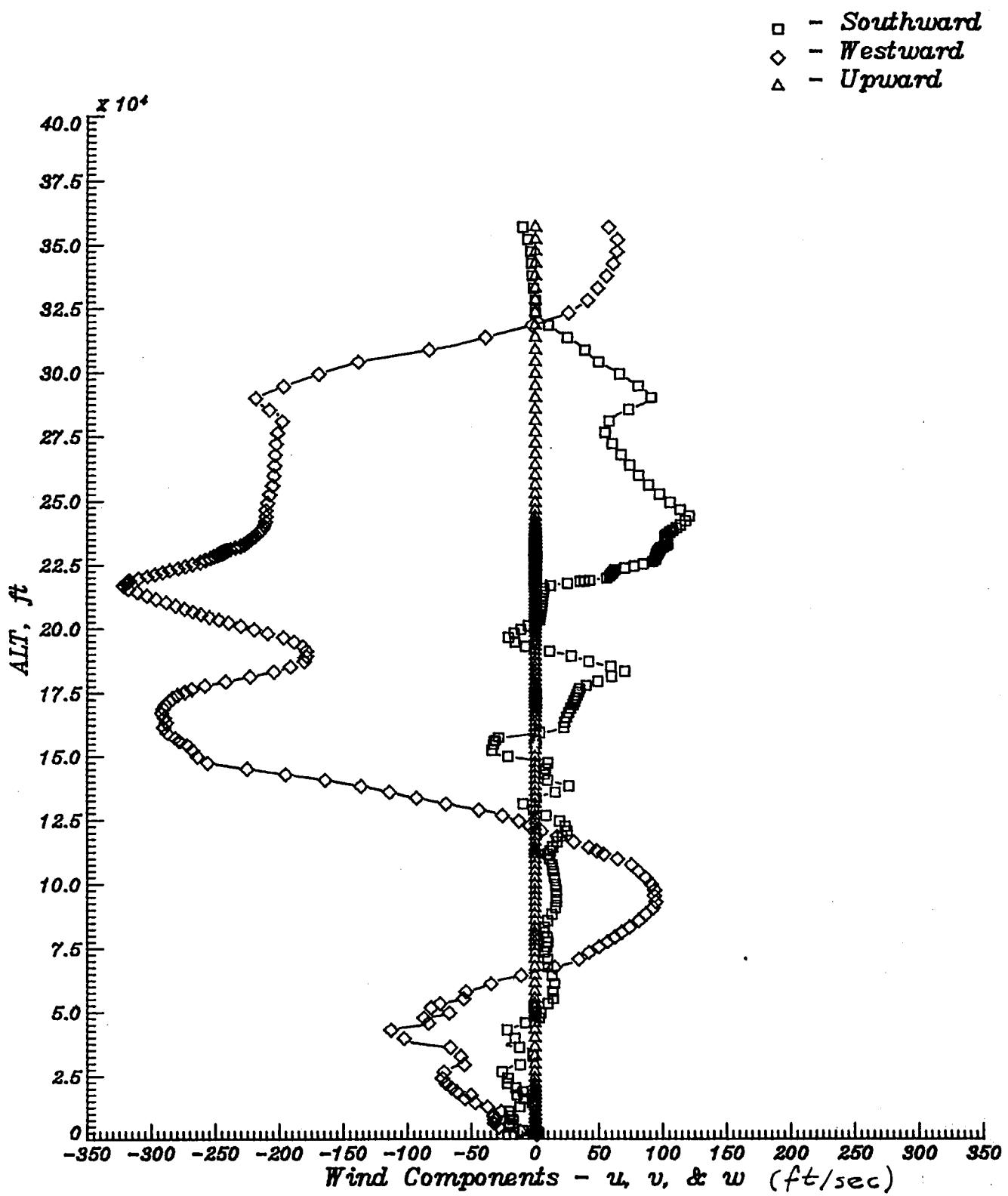


Figure II-13 STS-9 winds versus altitude

III. AEROBET Discussion

The AEROBET⁽³⁾ was developed based on the final Extended BET, STS9BET, and utilized the pre-processed 1 Hz OI reel NC0625 to define S/C configuration and RCS activity. The primary reel for the AEROBET is NL0624. A back-up (duplicate) reel was also generated, viz. NL0701. The remainder of this Section simply provides plots of some of the parameters on the final AEROBET.

Figure III-1 depicts the altitude history from epoch to landing. Altitude rate is plotted versus time and altitude in Figure III-2. Similarly, dynamic pressure and Mach number are plotted versus time and altitude as Figures III-3 and III-4, respectively. Figure III-5 shows V_{bar_∞} versus altitude down to $h \sim 180$ kft. Spacecraft air relative attitude angles, α , β , and σ are plotted versus time (Figure III-6), Mach (Figure III-7), and altitude (Figure III-8) for information. Spacecraft dynamic measurements derived from IMU2 are plotted in Figures III-9 (vs Mach) and III-10 (versus altitude). These angular rate and acceleration data are replots of the same data presented in Figures I-1 of Section I. Control surface deflections are presented versus time, Mach, and altitude as Figures III-11, III-12, and III-13, respectively. Similar plots of the RCS jet activity are presented in Figures III-14 through III-16. This concludes the trajectory, air relative parameter, and configuration plots of STS-9.

Figure III-17a and 17b show L/D comparisons versus Mach for the Mach intervals as indicated thereon. Shown on each figure are flight values (0), predicts (Δ), and variations, i.e., the pre-flight uncertainty. Figures III-18a and 18b show the same L/D comparisons versus altitude. Lift coefficient comparisons versus Mach and altitude are given in Figures III-19 a,b and III-20 a,b, respectively. Again, flight, predicts and variations are shown. Drag comparisons are next presented as Figures III-21a through 22b versus Mach and altitude in the hypersonic and subsonic regions of flight. Figures III-23a and 23b summarize the previous aerodynamic comparisons by showing percentage differences (flight-data base) versus Mach number. Figure 23a shows supersonic and hypersonic lift, drag, and L/D differences. Subsonic results are presented as

(3) See AMA Report 82-9 for file contents, Appendix A for mass properties utilized.

Figure III-23b. Shown on each figure are ensemble statistics representing the results based on the first five Columbia flights, STS-1 through STS-5. Figures III-24a and III-24b are plots of the same percentage differences versus altitude, the latter plotted over regions conforming to the two Mach intervals selected.

The last two figures presented show pitching moment coefficient comparisons. Figure III-25 shows flight, predicts, and variations versus Mach number. These data are presented for the best available flight center-of-gravity information. The percentage equivalent of the differences shown in Figure III-25 is plotted as Figure III-26 though here these results have been transformed to the 65 percent X/L reference c.g. for the data base. Again, previous Columbia results are shown thereon as the shaded region. The quite different results in the hypersonic regime reflect the significantly different body flap profile flown for STS-9.

h , kft

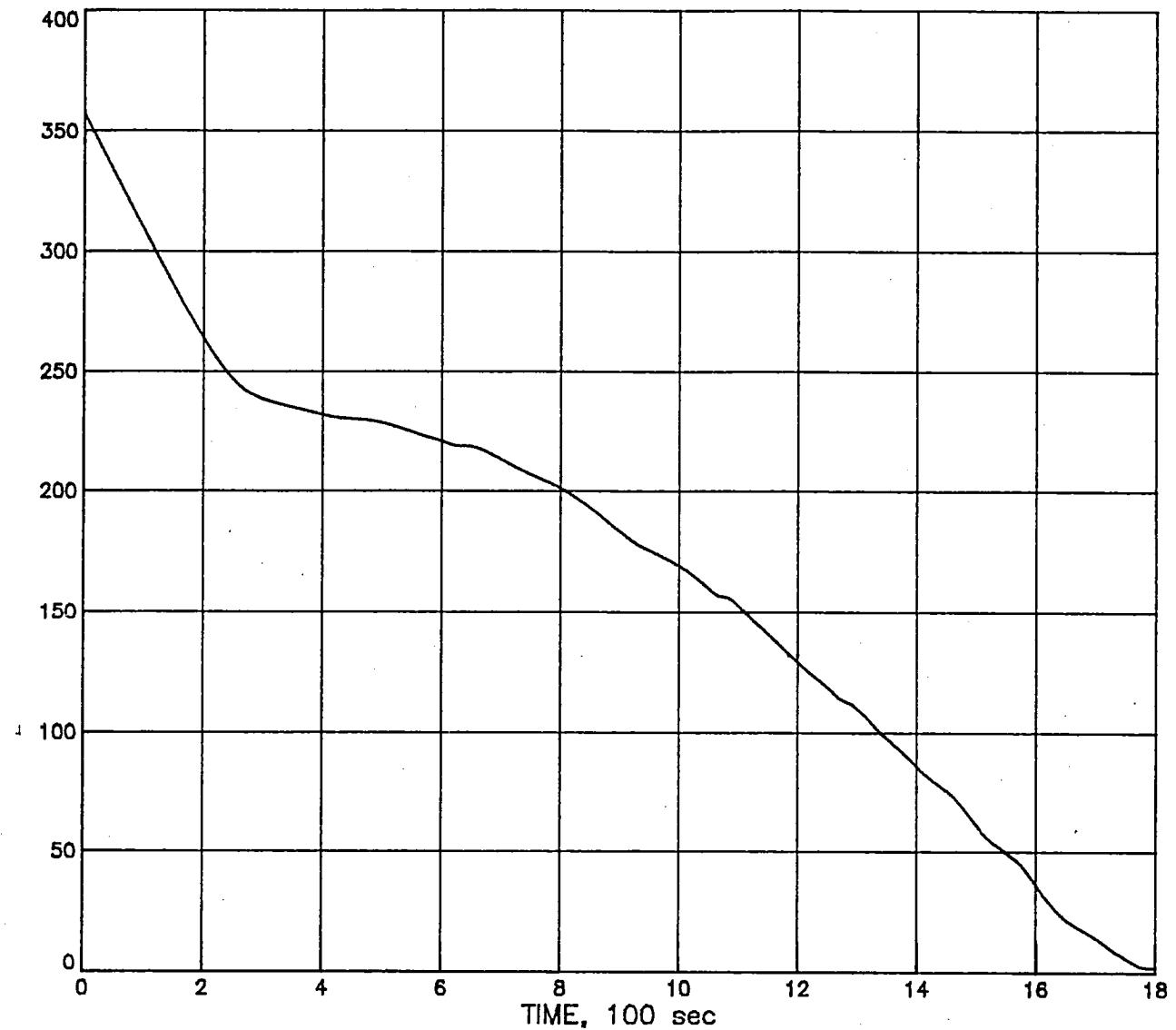
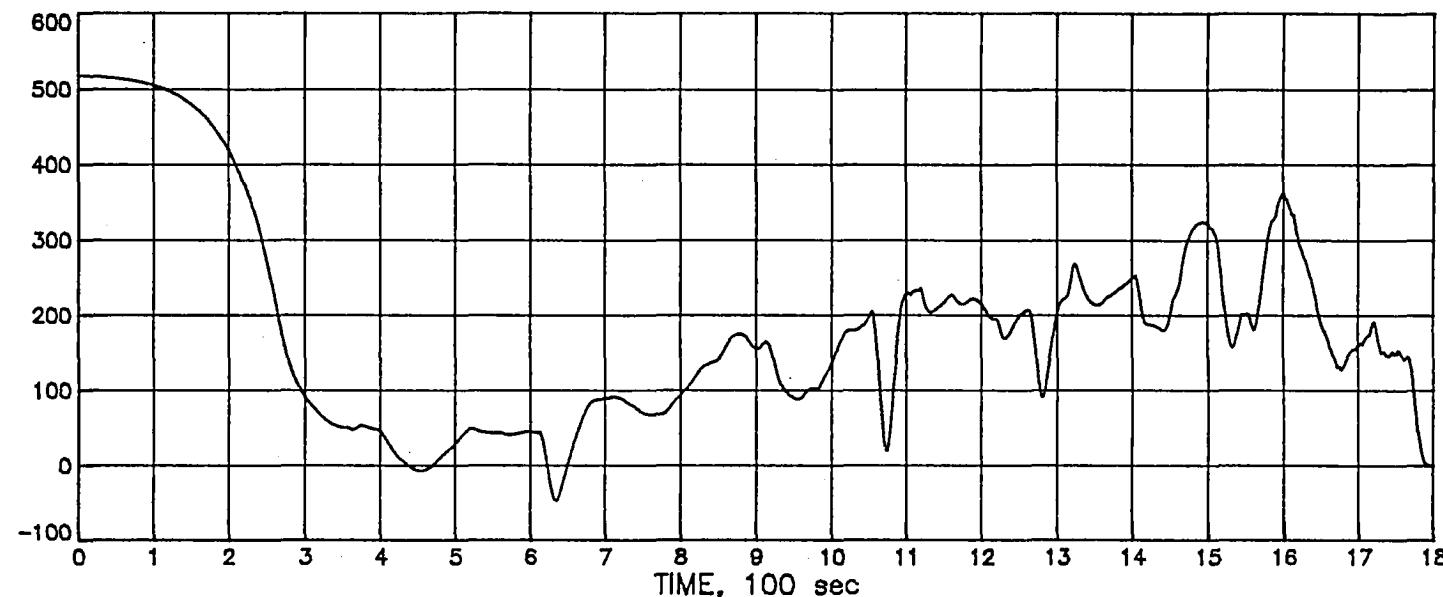


Figure III-1. STS-9 altitude time history

w , fps



w , fps

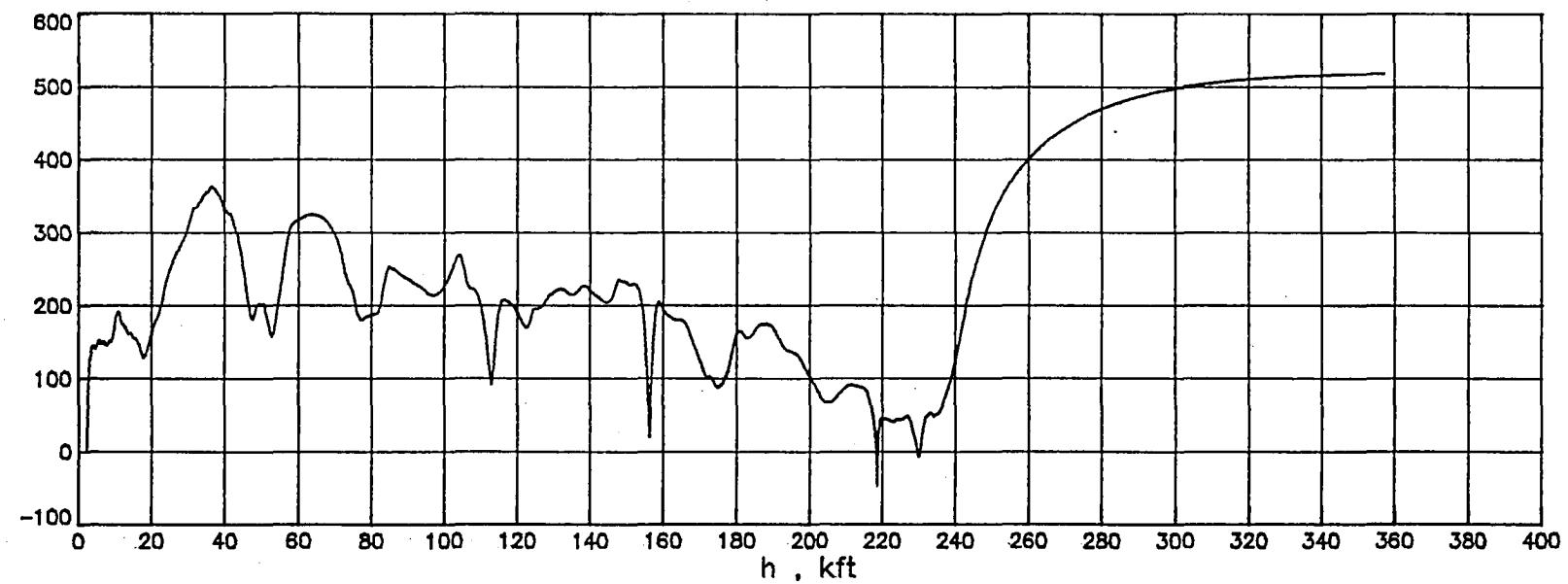
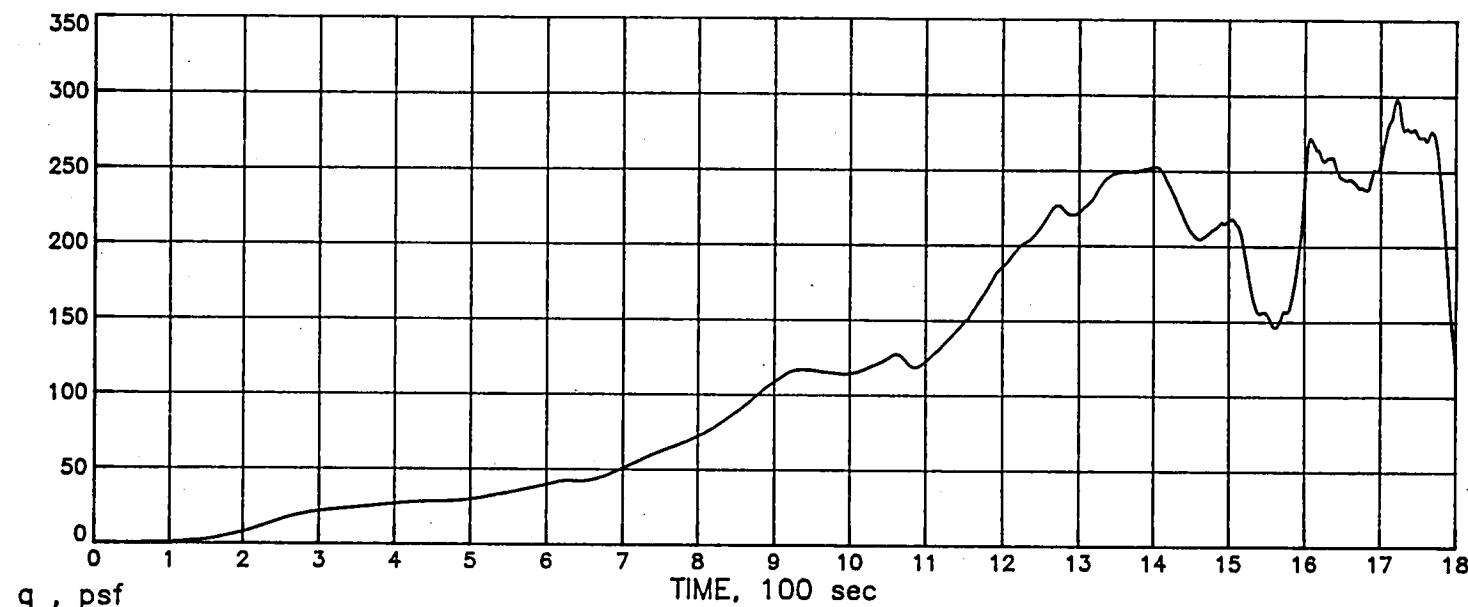


Figure III-2. STS-9 descent rate versus time and altitude ($h = -w$)

q , psf



q , psf

TIME, 100 sec

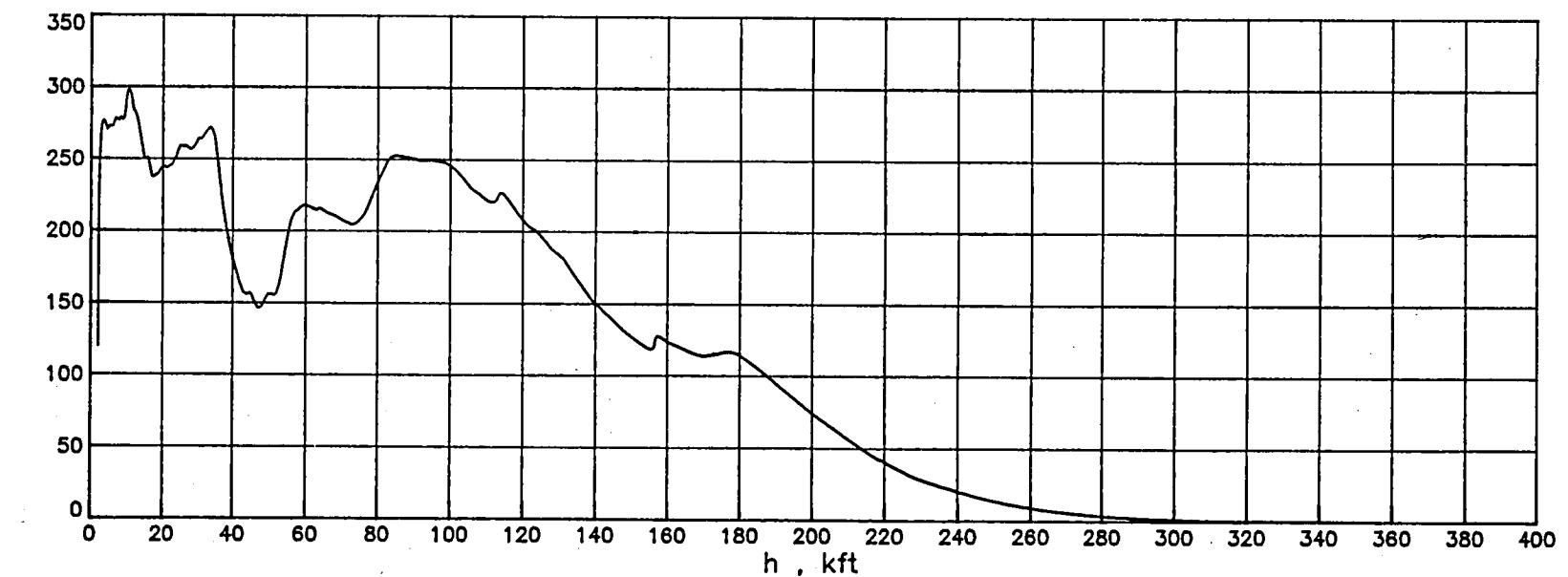
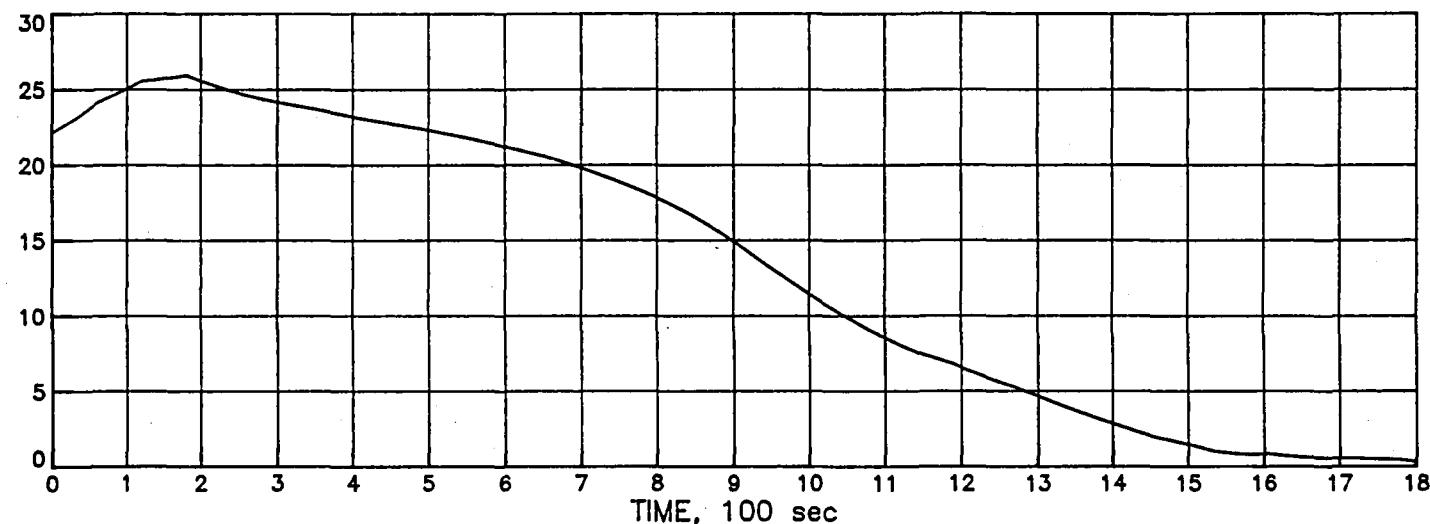


Figure III-3. STS-9 dynamic pressure vs. time and altitude

Mach



-42-

Mach

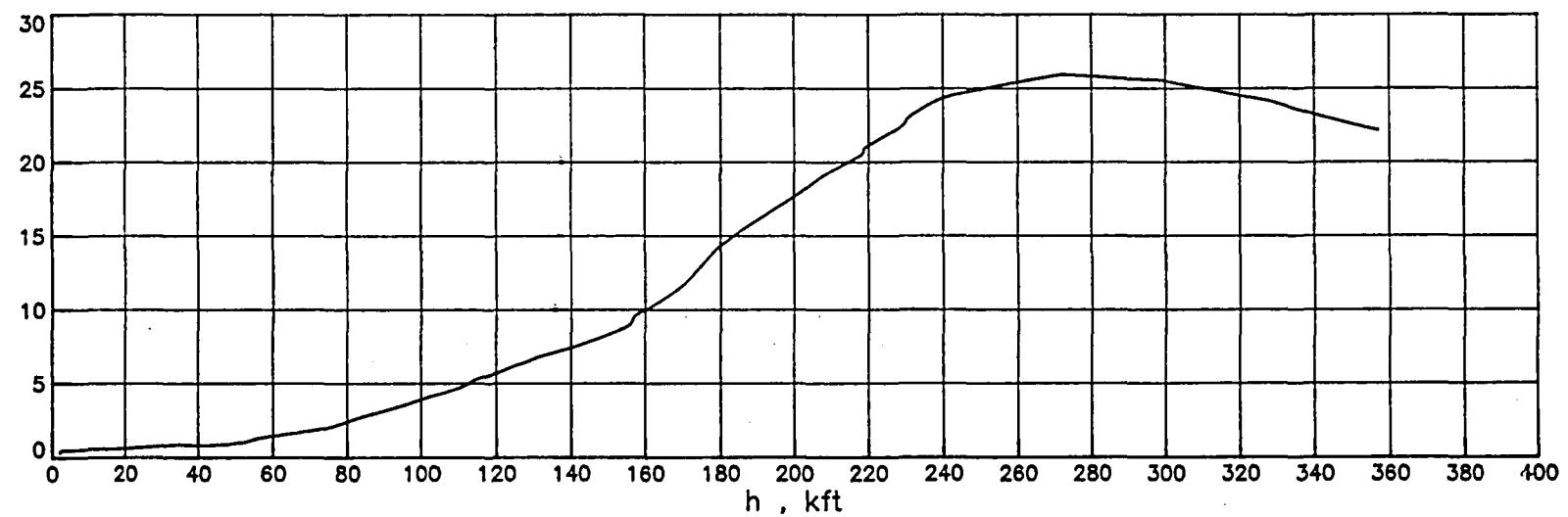


Figure III-4. STS-9 Mach number versus time and altitude

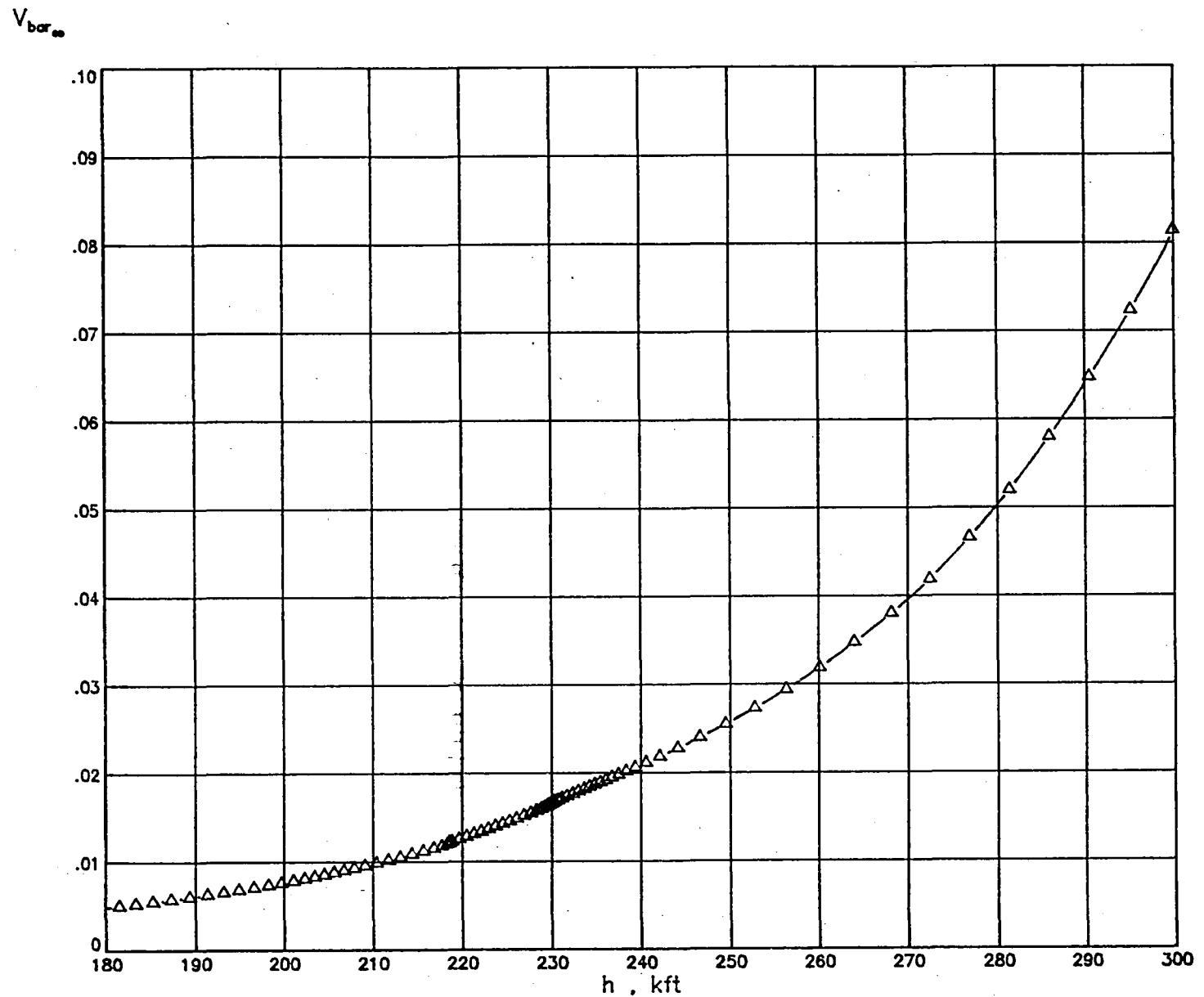


Figure III-5. STS-9 $V_{bar_{\infty}}$ versus altitude

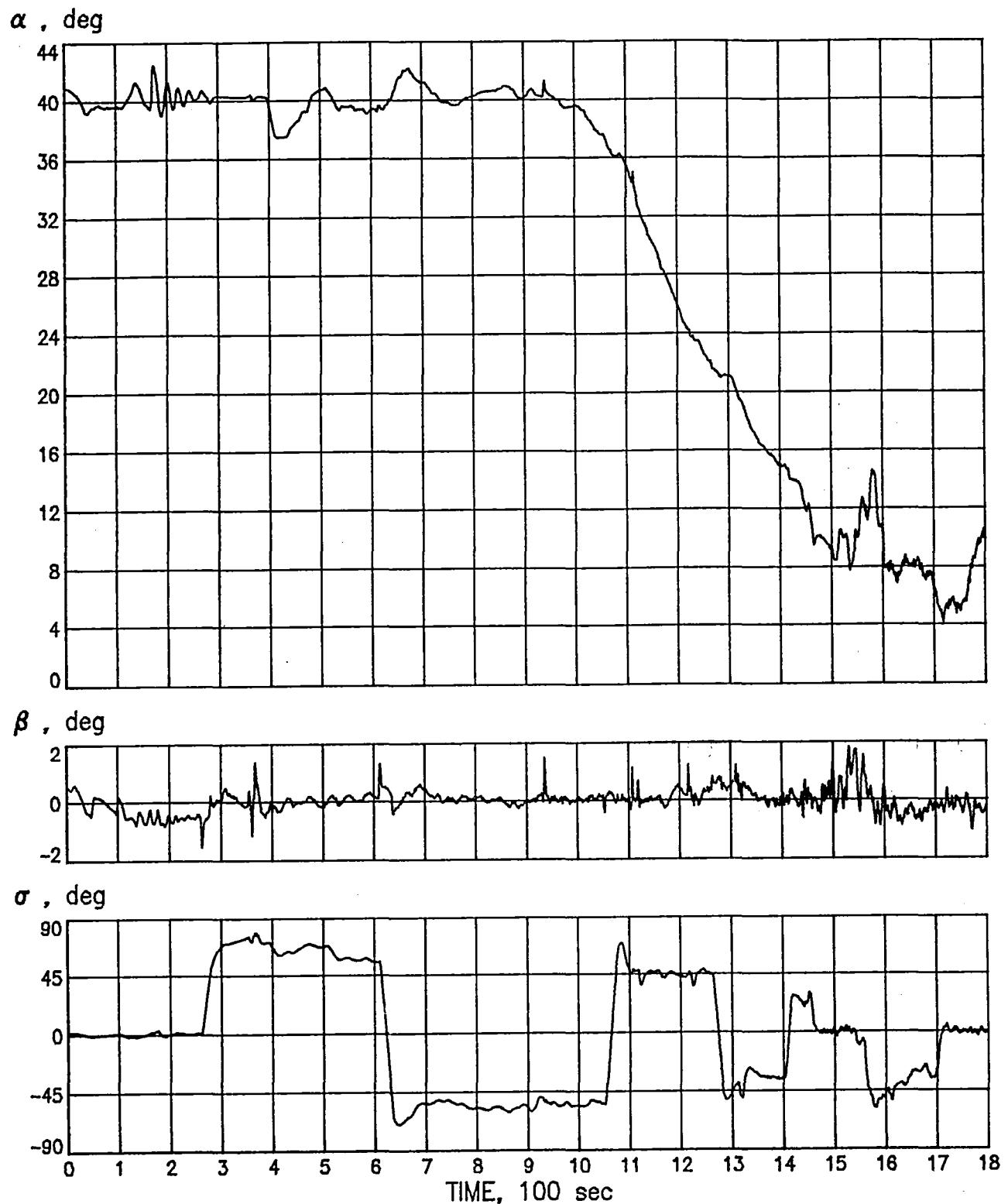


Figure III-8. STS-9 α , β and σ vs. time

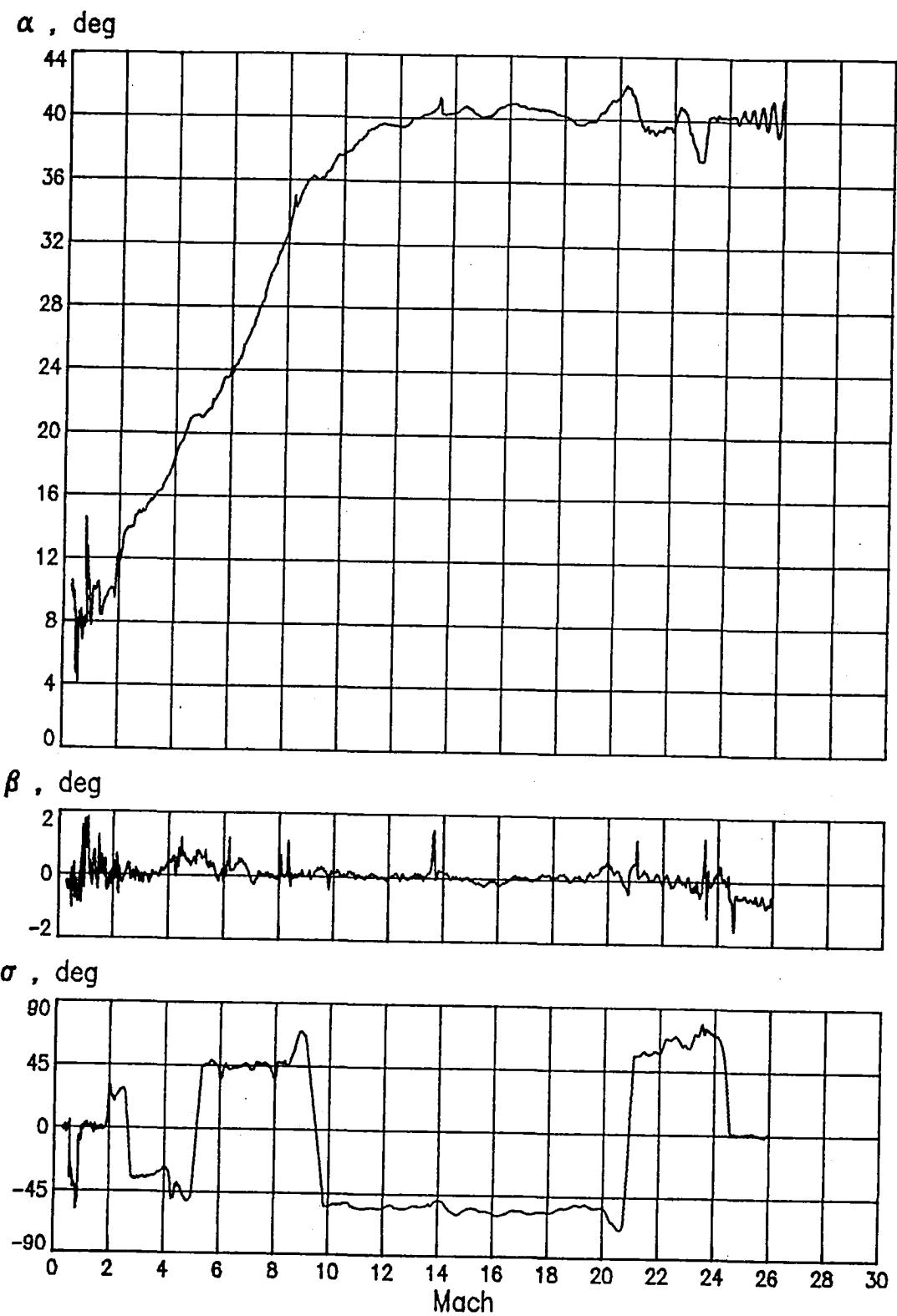


Figure III-7. STS-9 α , β and σ vs. Mach

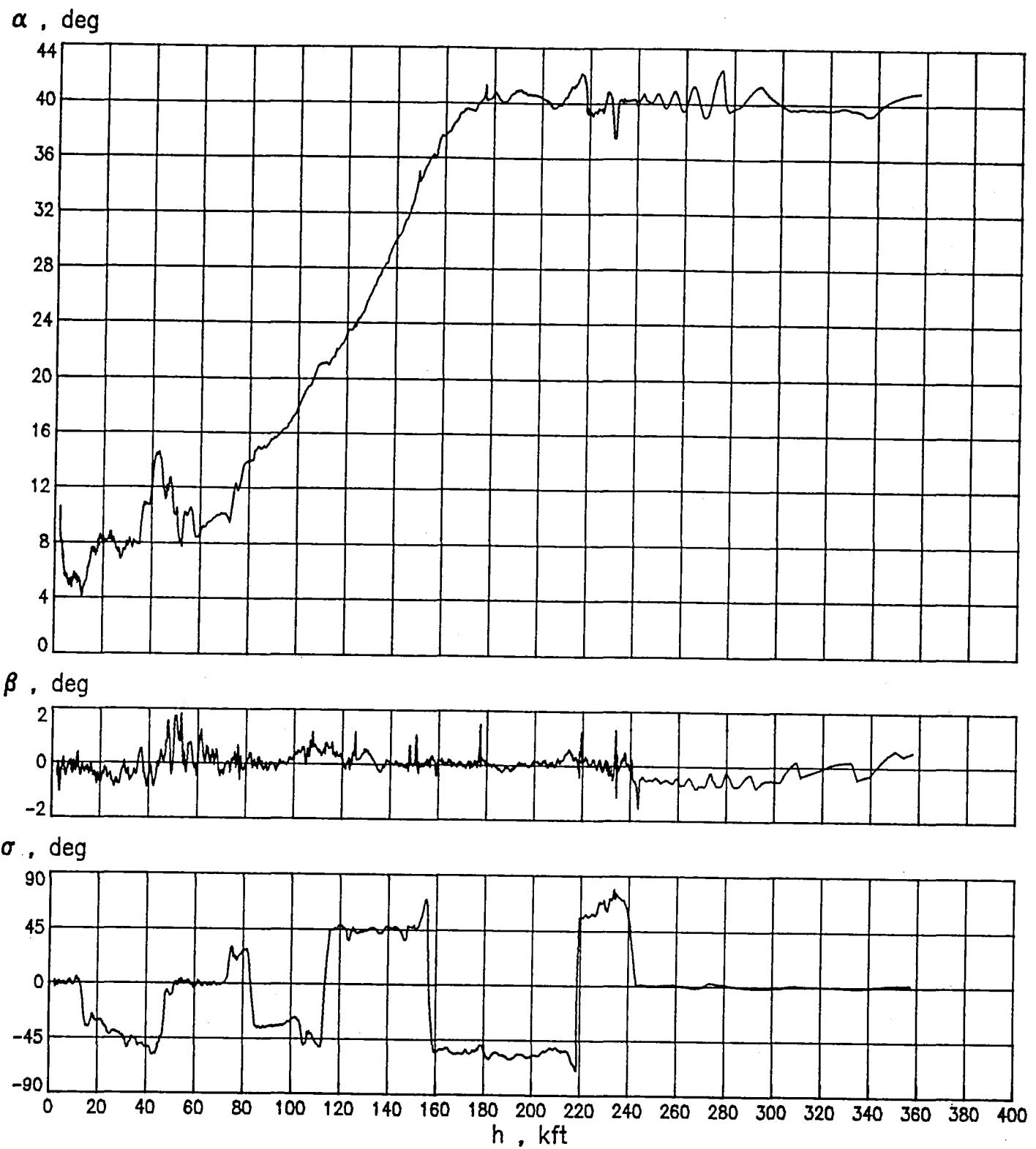
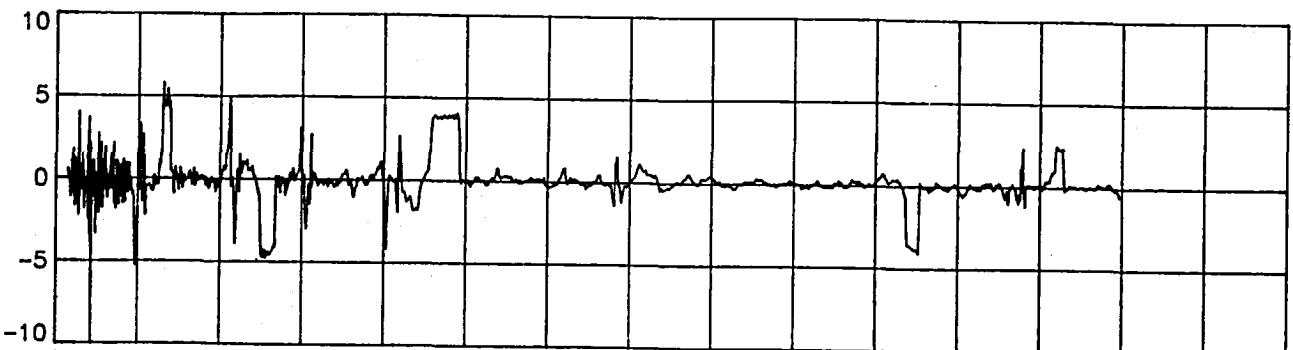
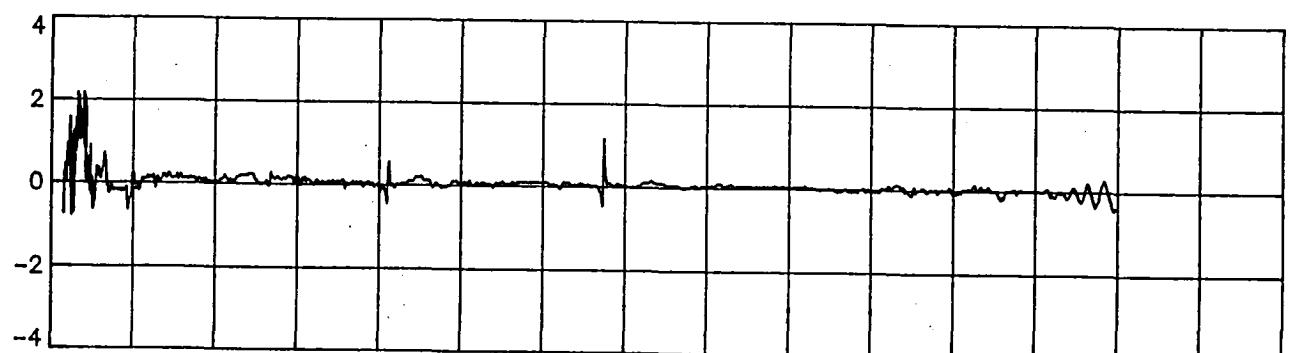


Figure III-8. STS-9 α , β and σ vs. h

P_B , deg/sec



Q_B , deg/sec



R_B , deg/sec

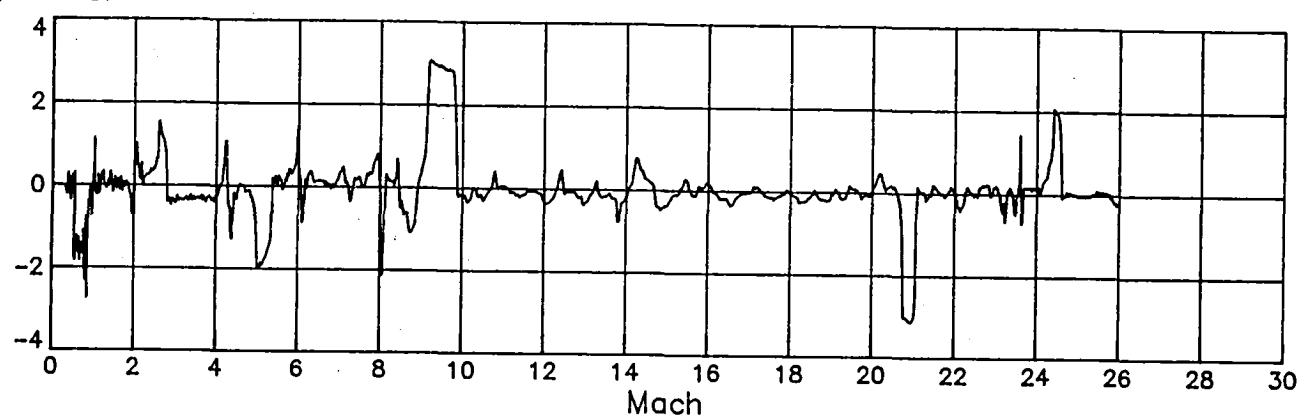


Figure III-9. STS-9 dynamic data vs. Mach

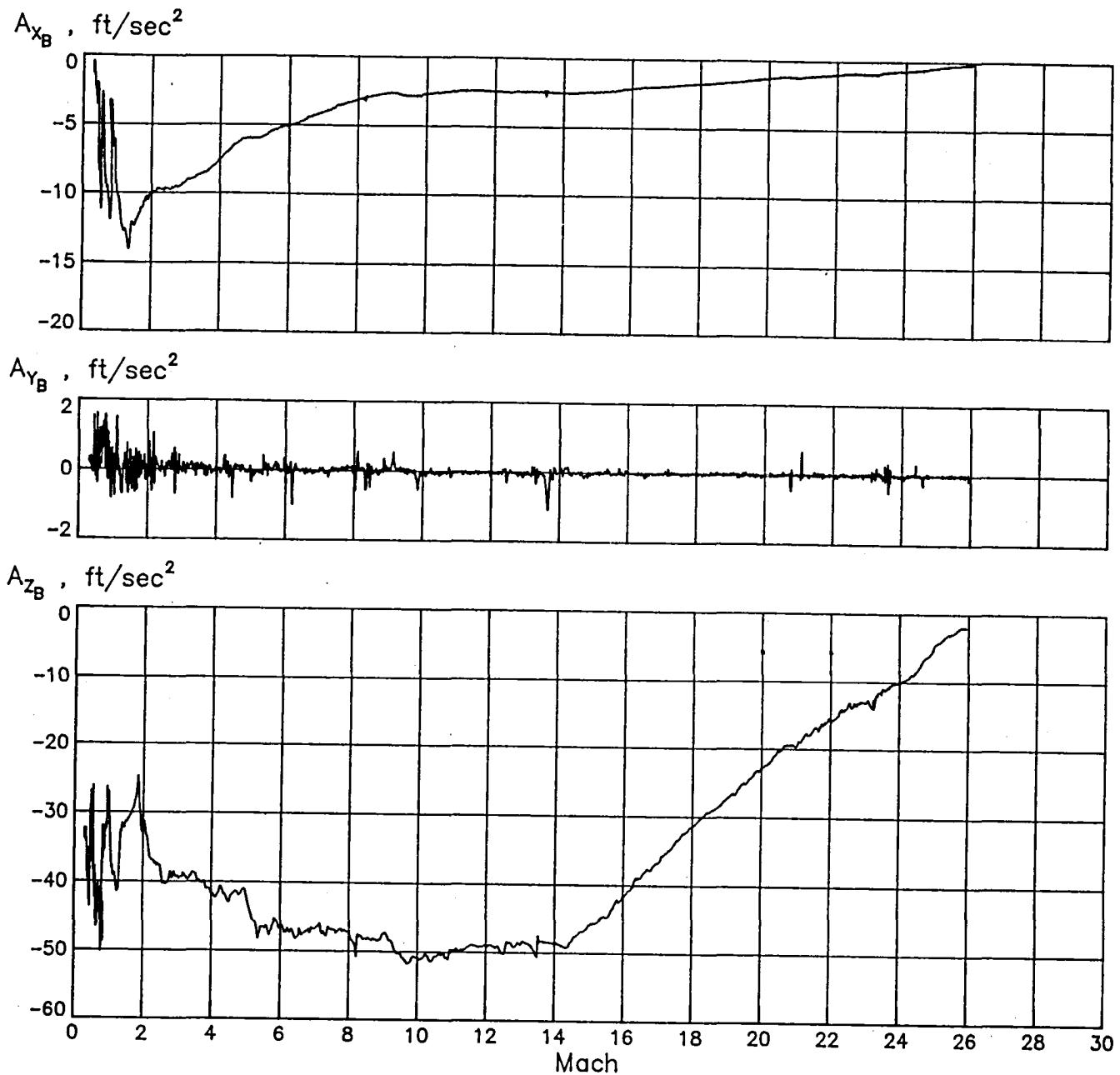
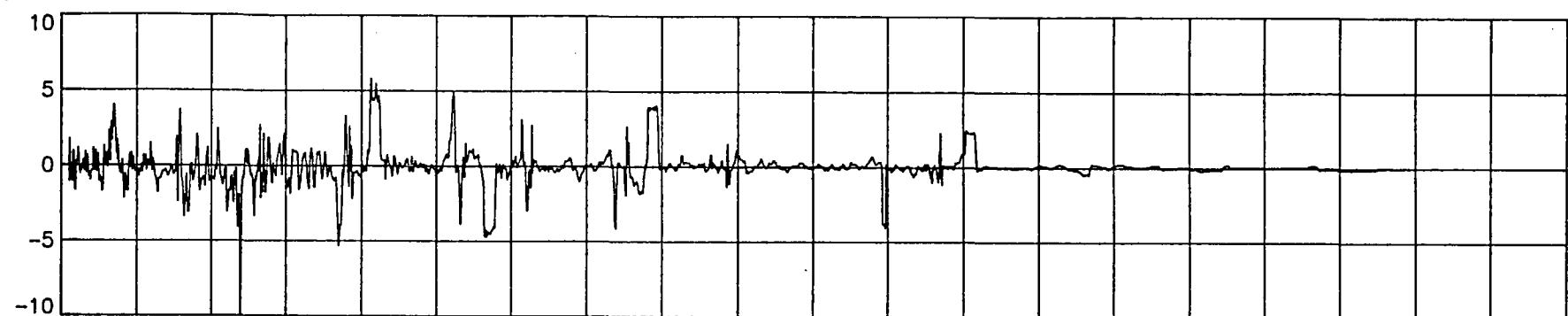
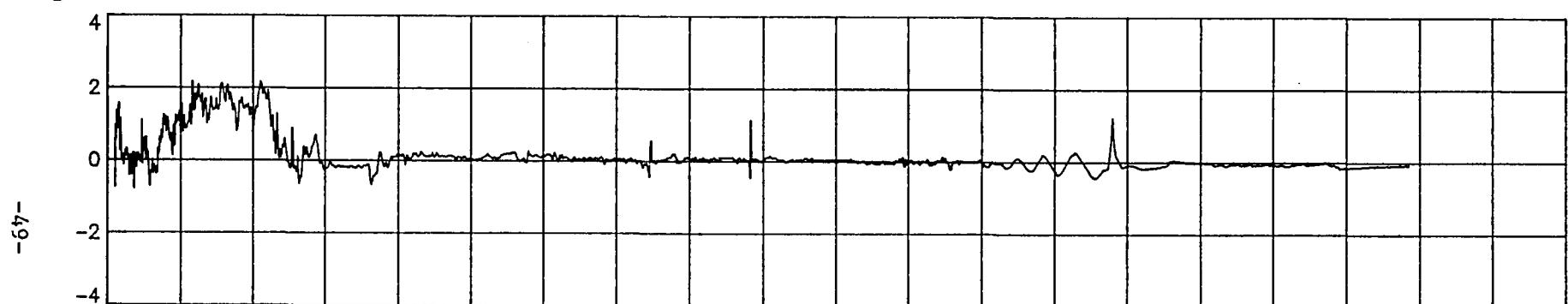


Figure III-9. (CONCLUDED)

P_B , deg/sec



Q_B , deg/sec



R_B , deg/sec

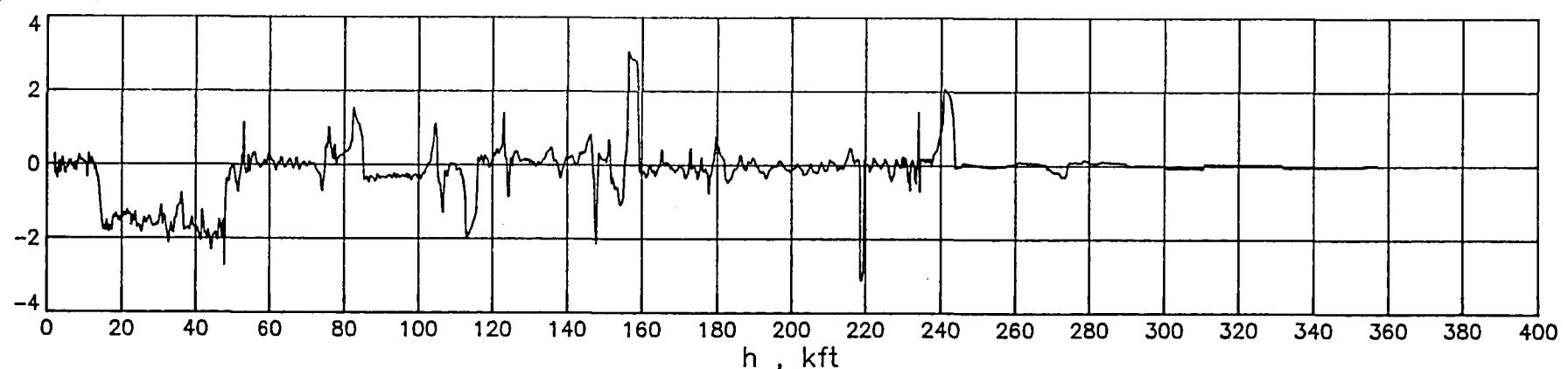


Figure III-10. STS-9 dynamic data vs. altitude

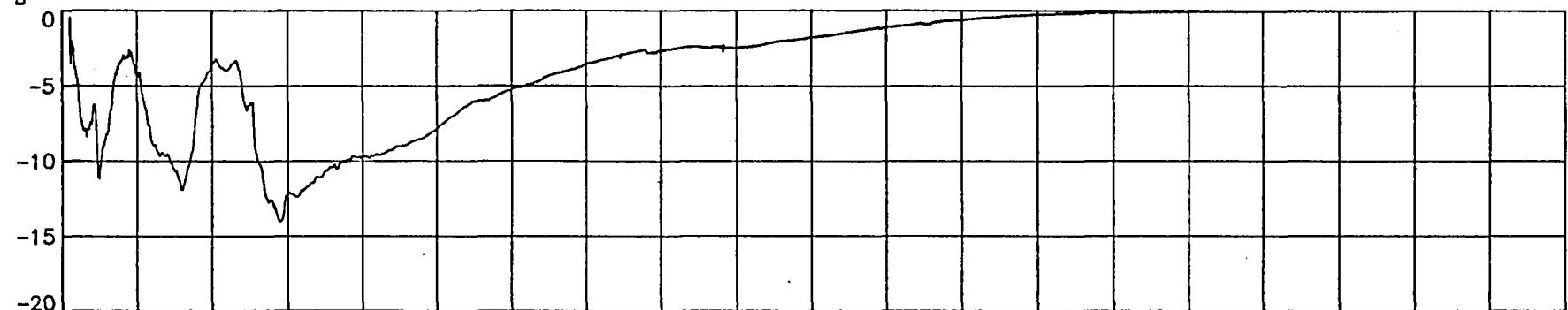
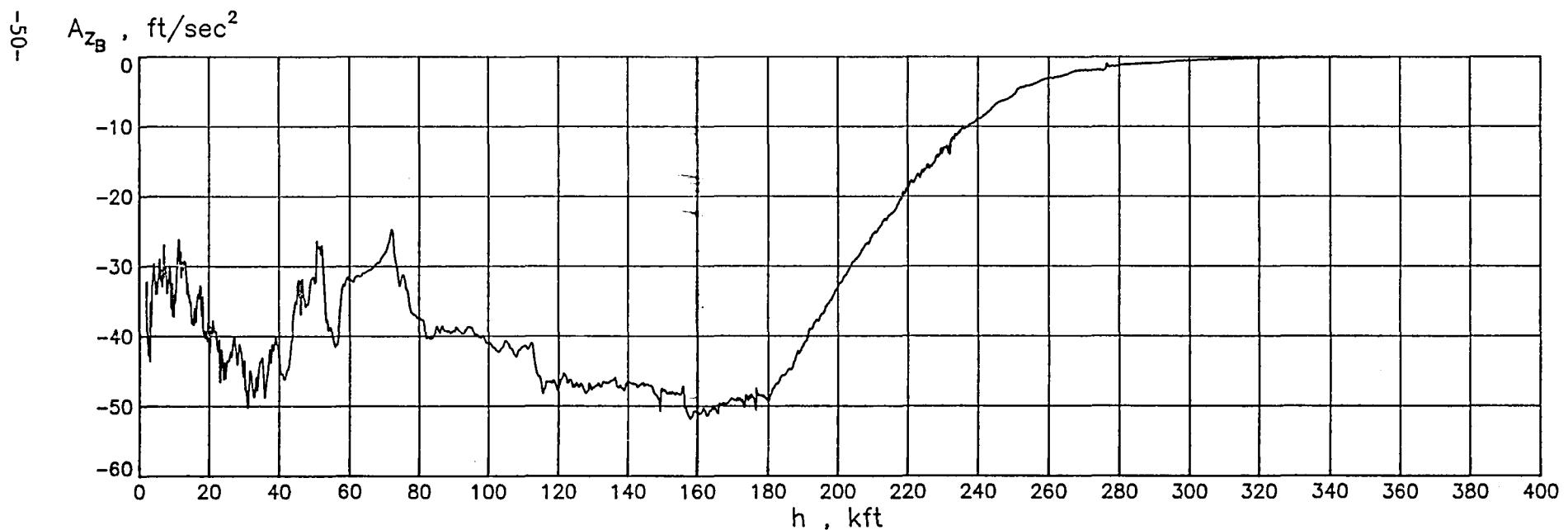
A_{x_B} , ft/sec² A_{y_B} , ft/sec² A_{z_B} , ft/sec²

Figure III-10. (CONCLUDED)

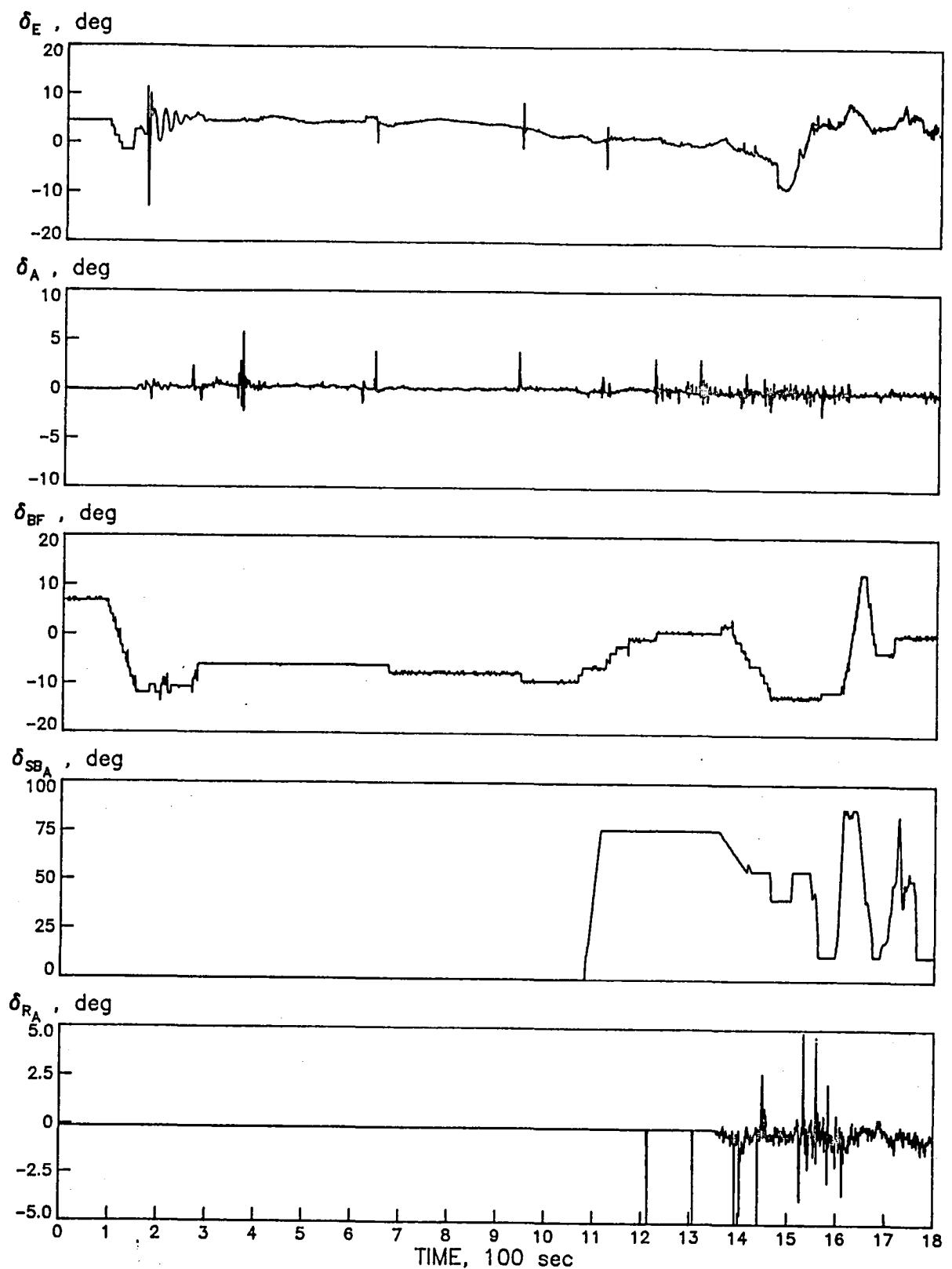


Figure III-11. STS-9 control surfaces vs. time

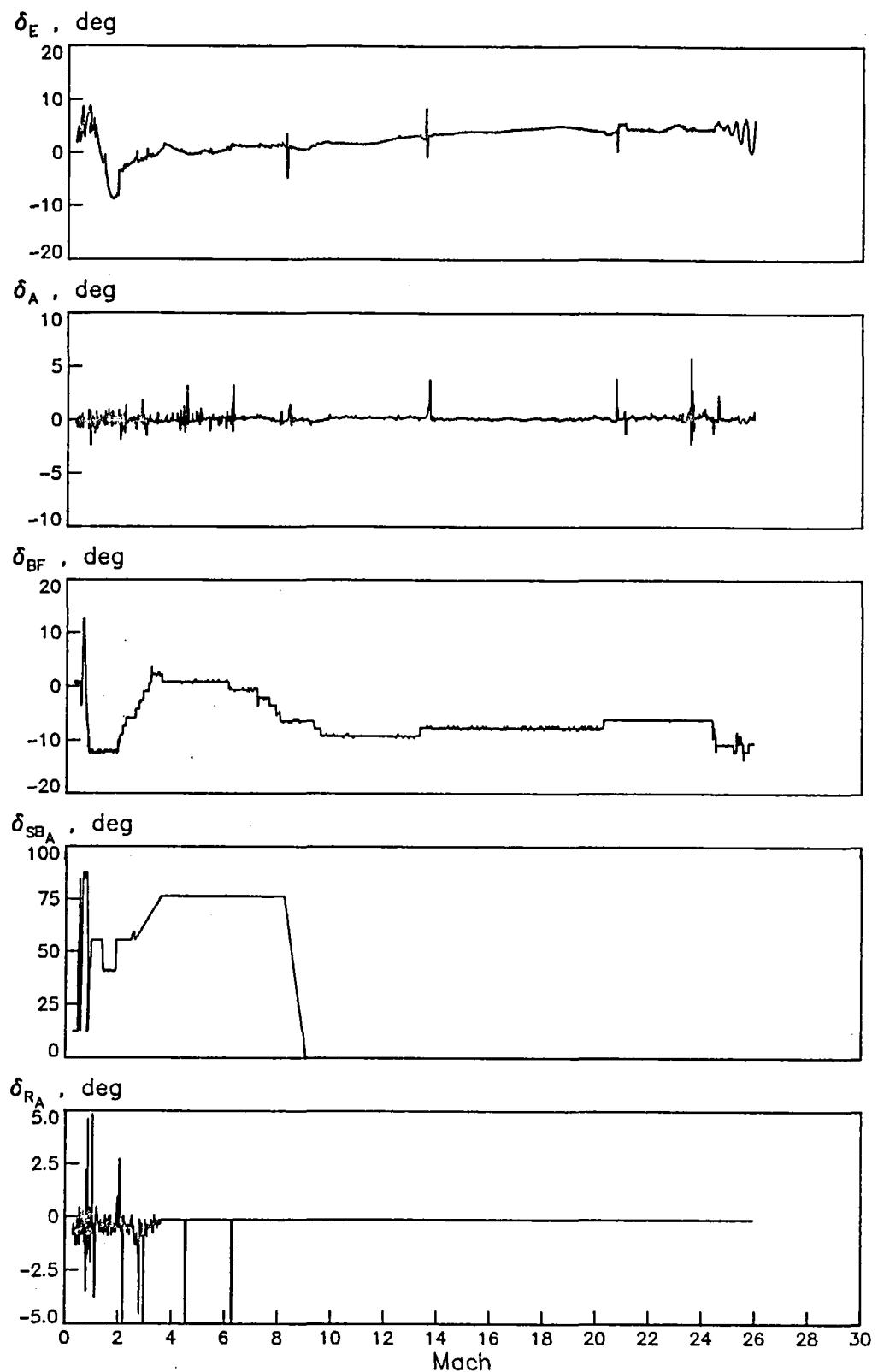


Figure III-12. STS-9 control surfaces vs. Mach

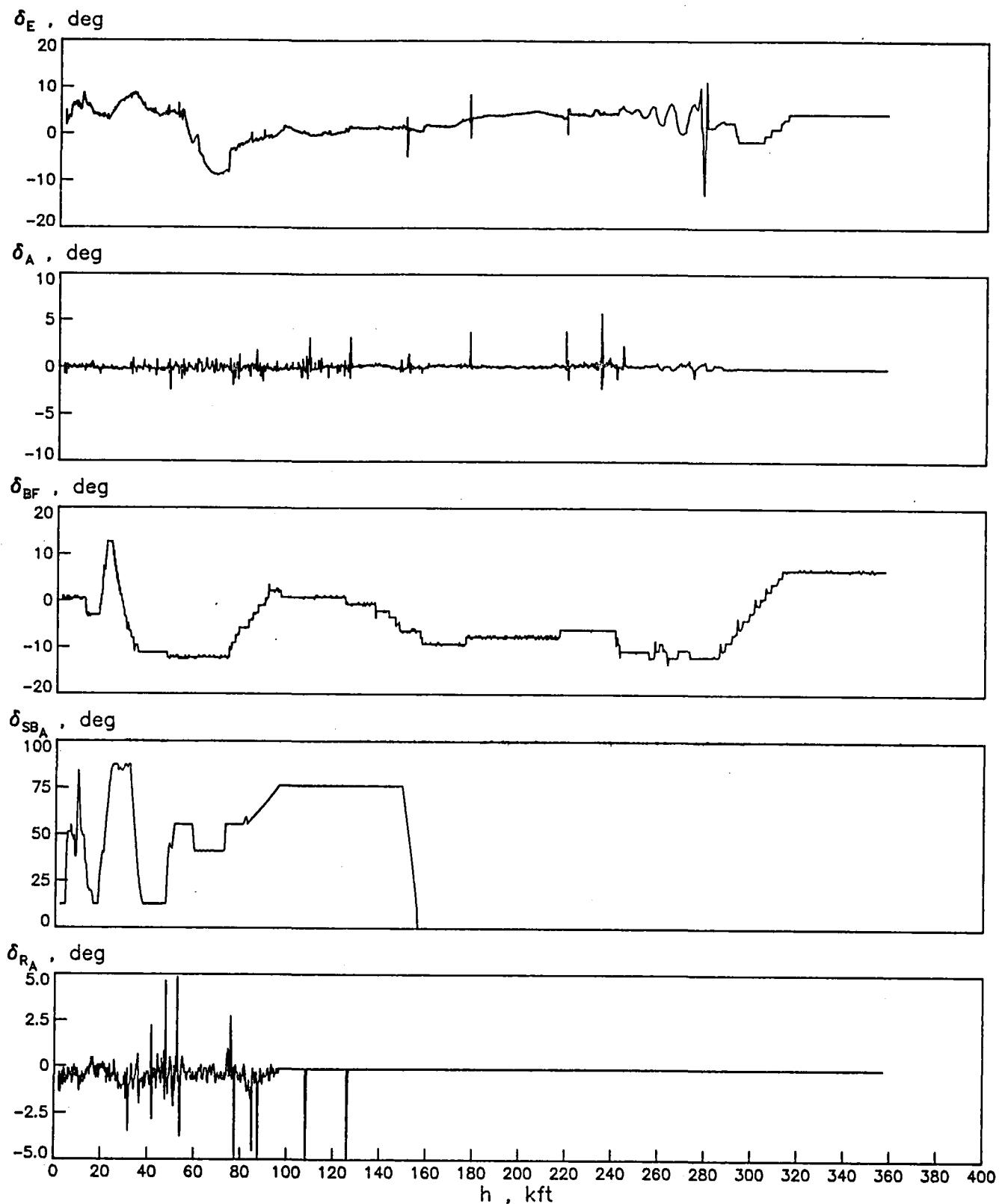
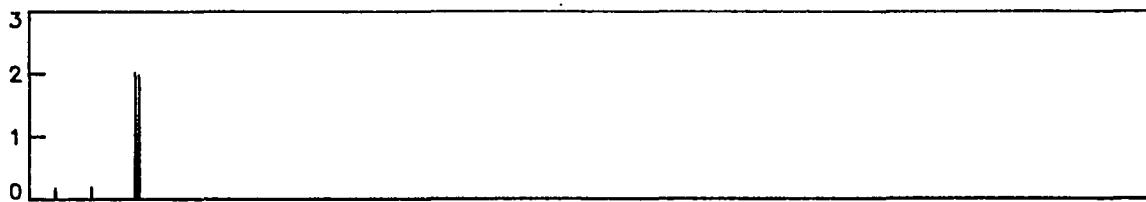
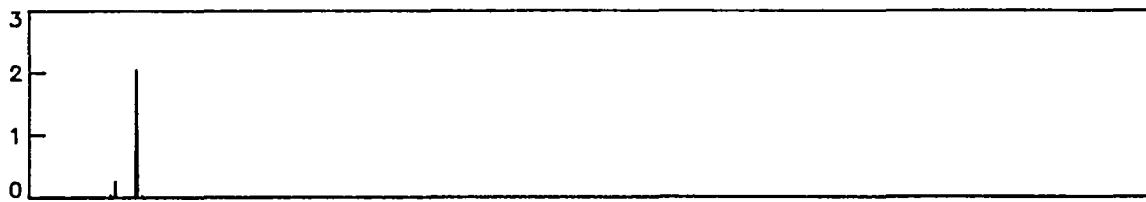


Figure III-13. STS-9 control surfaces vs. altitude

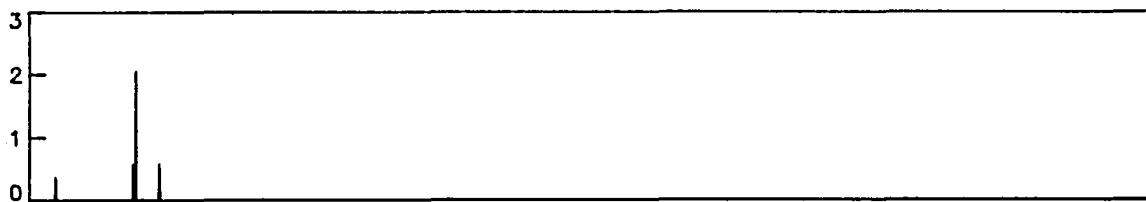
LHUF JETs



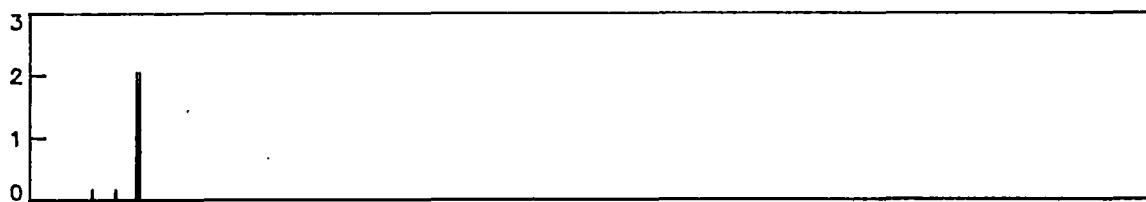
LHDF JETs



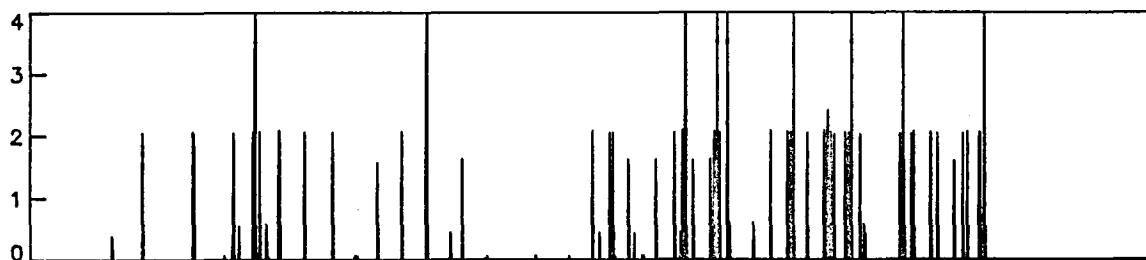
RHUF JETs



RHDF JETs



YAWP JETs



YAWN JETs

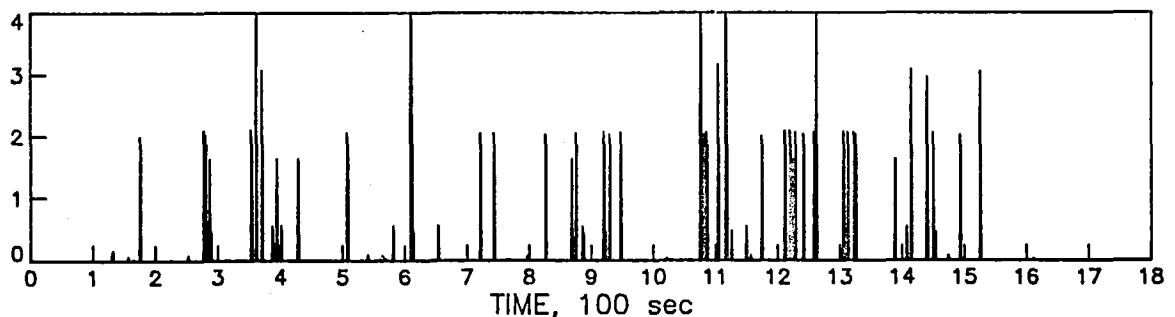
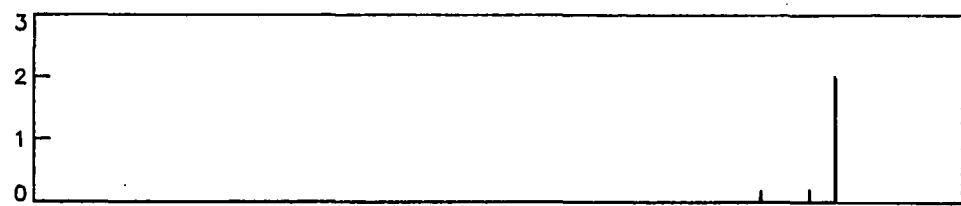
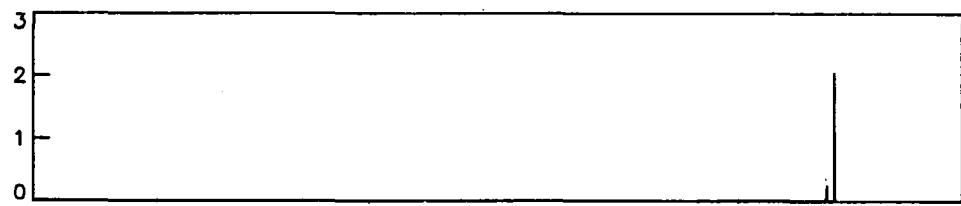


Figure III-14. STS-9 RCS firings vs. time

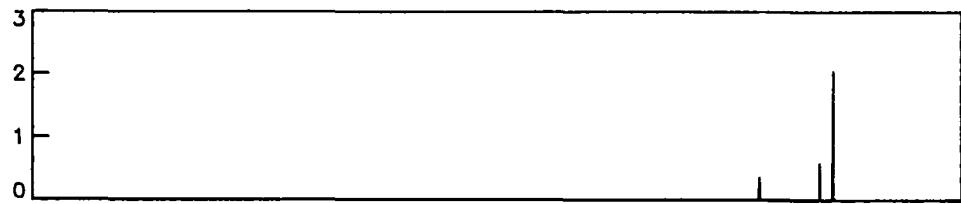
LHUF JETs



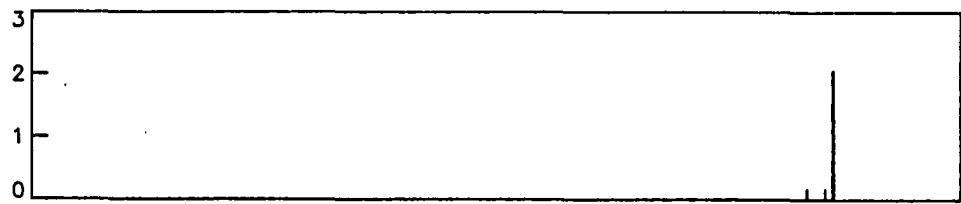
LHDF JETs



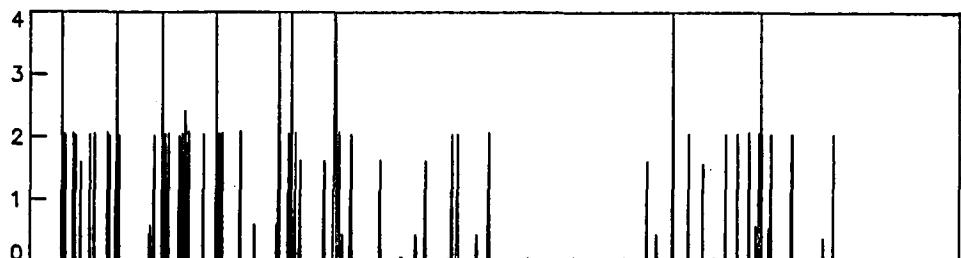
RHUF JETs



RHDF JETs



YAWP JETs



YAWN JETs

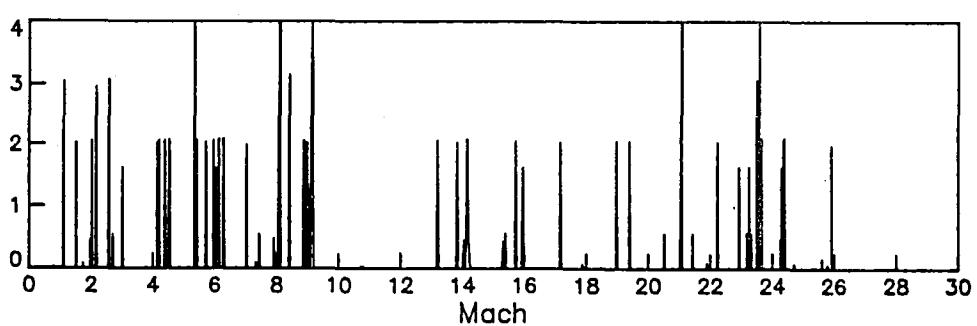
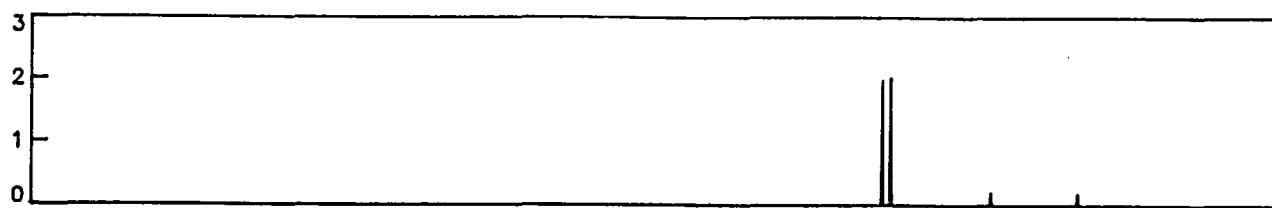
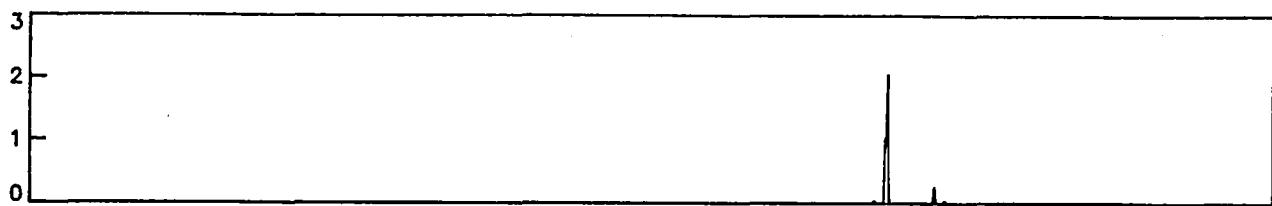


Figure III-15. STS-9 RCS firings vs. Mach

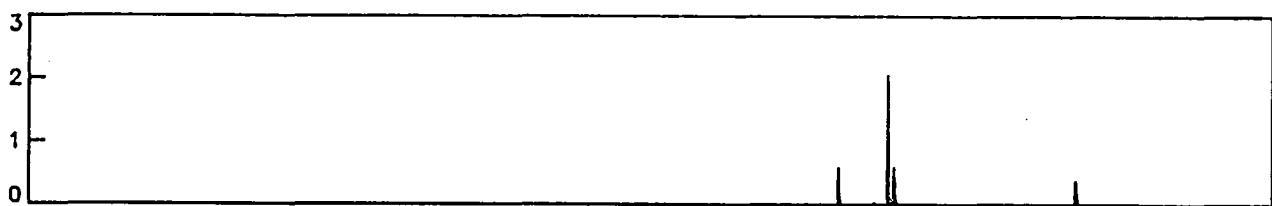
LHUF JETs



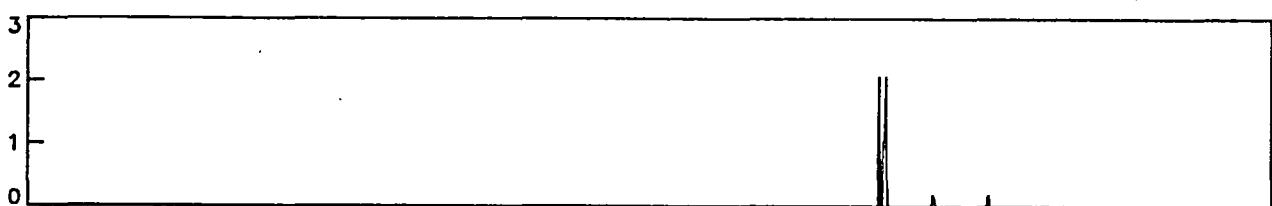
LHDF JETs



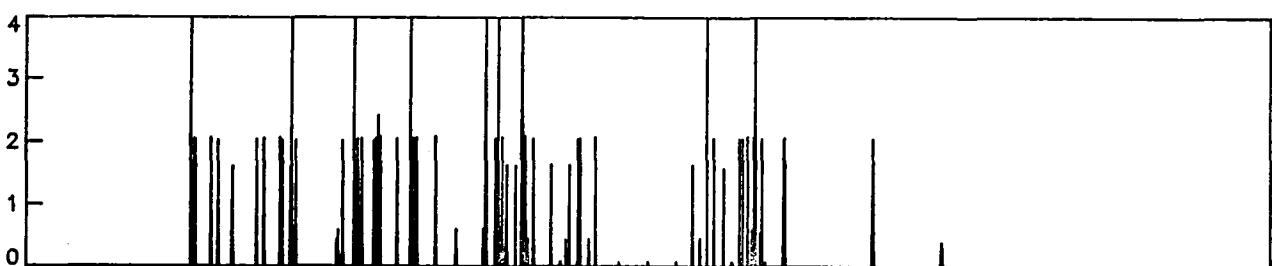
RHUF JETs



RHDF JETs



YAWP JETs



YAWN JETs

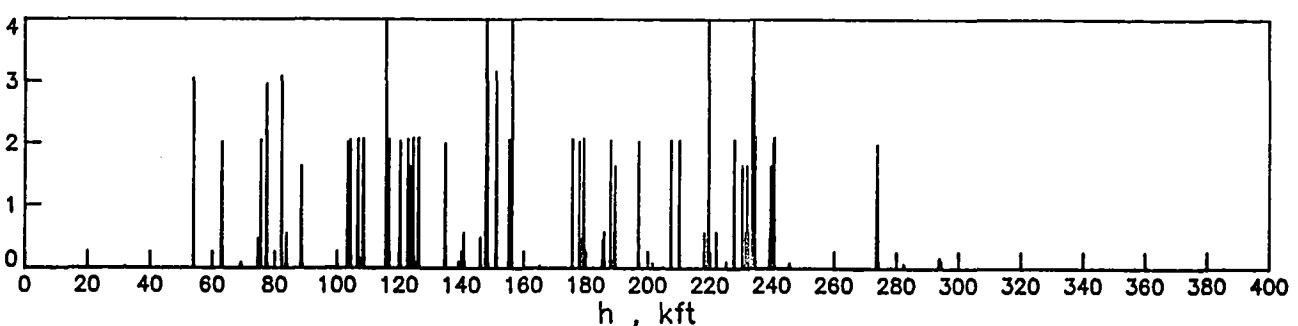


Figure III-16. STS-9 RCS firings vs. altitude

L/D

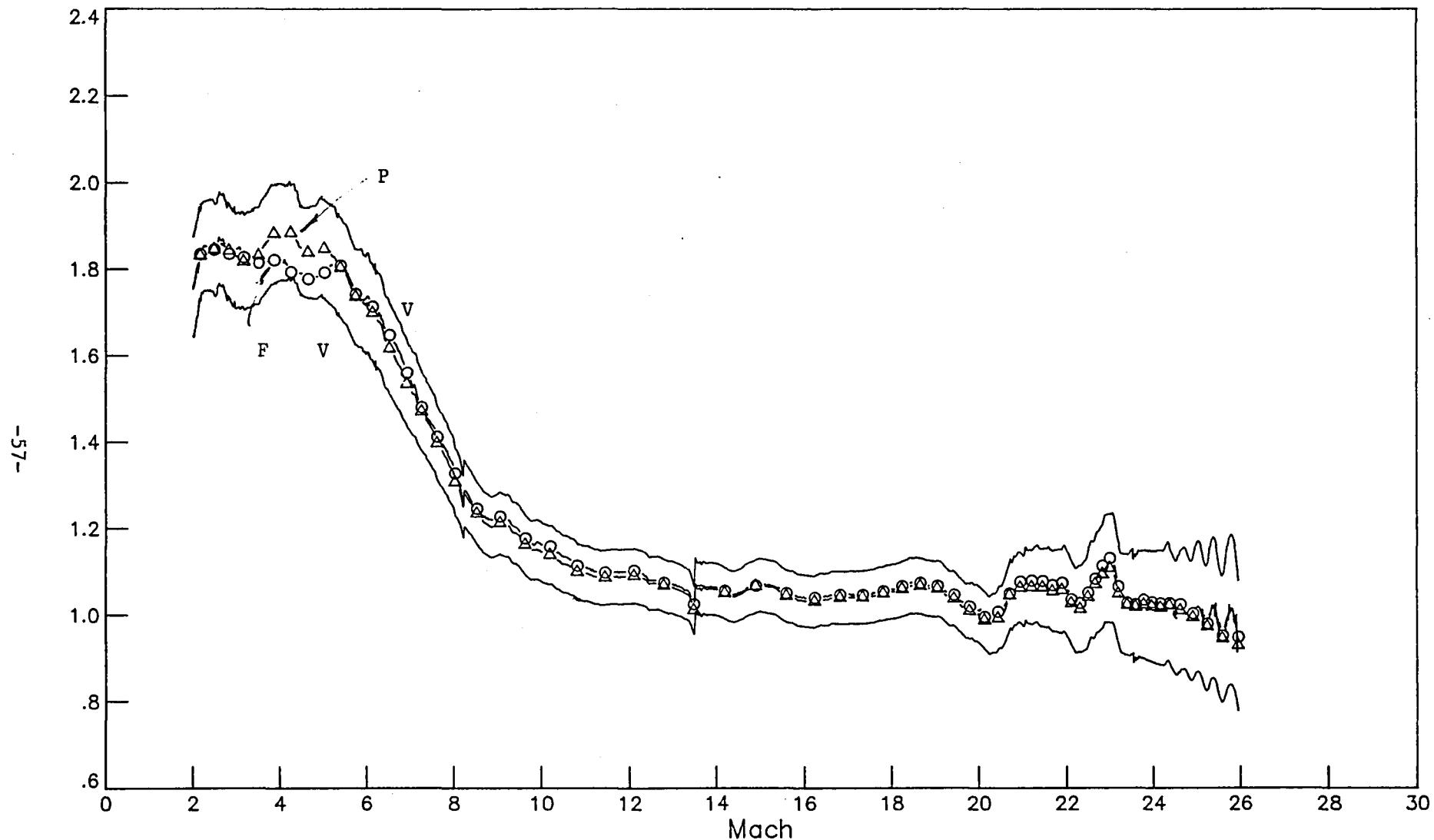


Figure III-17a. STS-9 L/D comparisons vs. Mach

L/D

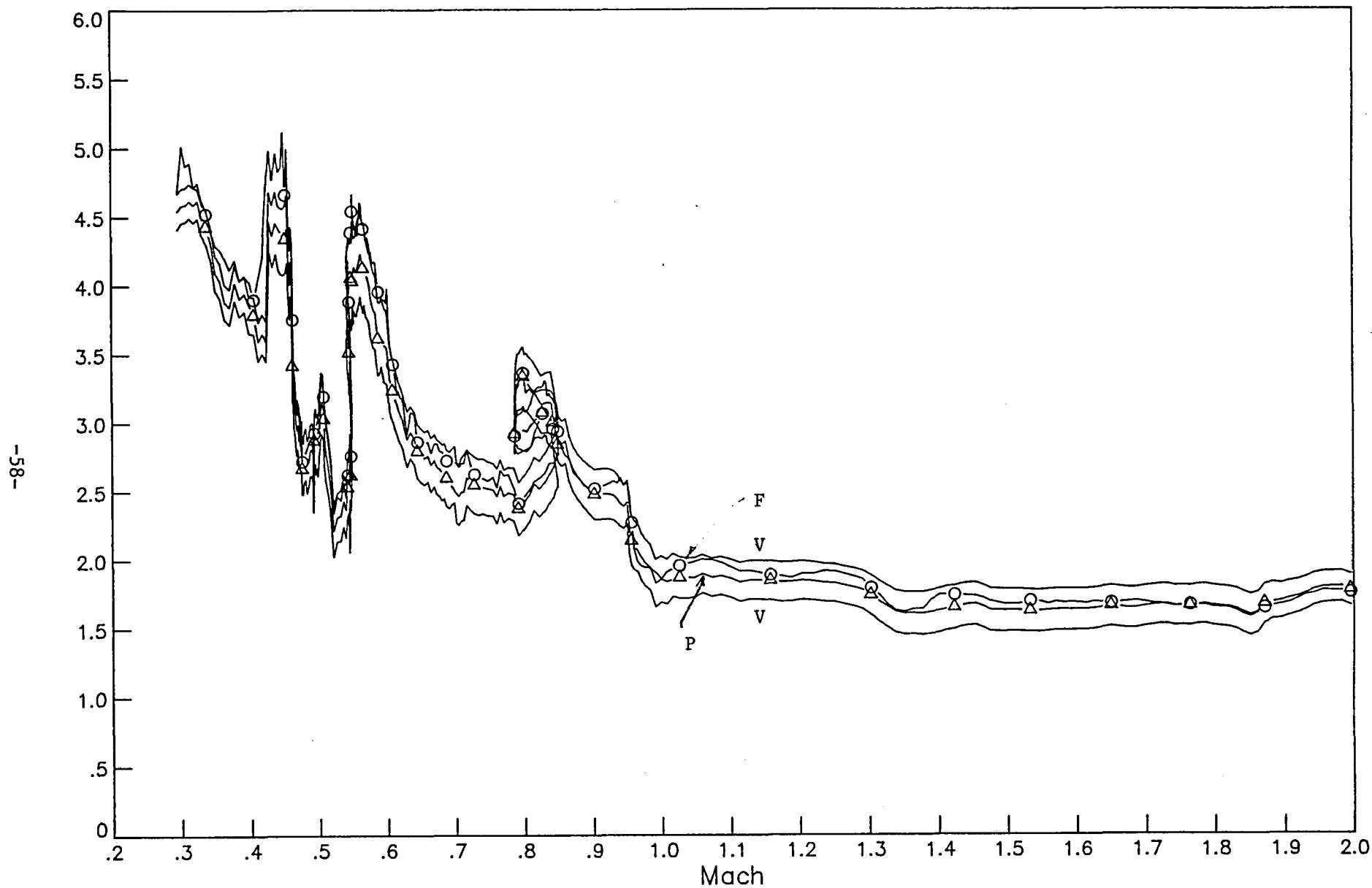


Figure III-17b. STS-9 L/D comparisons vs. Mach

L/D

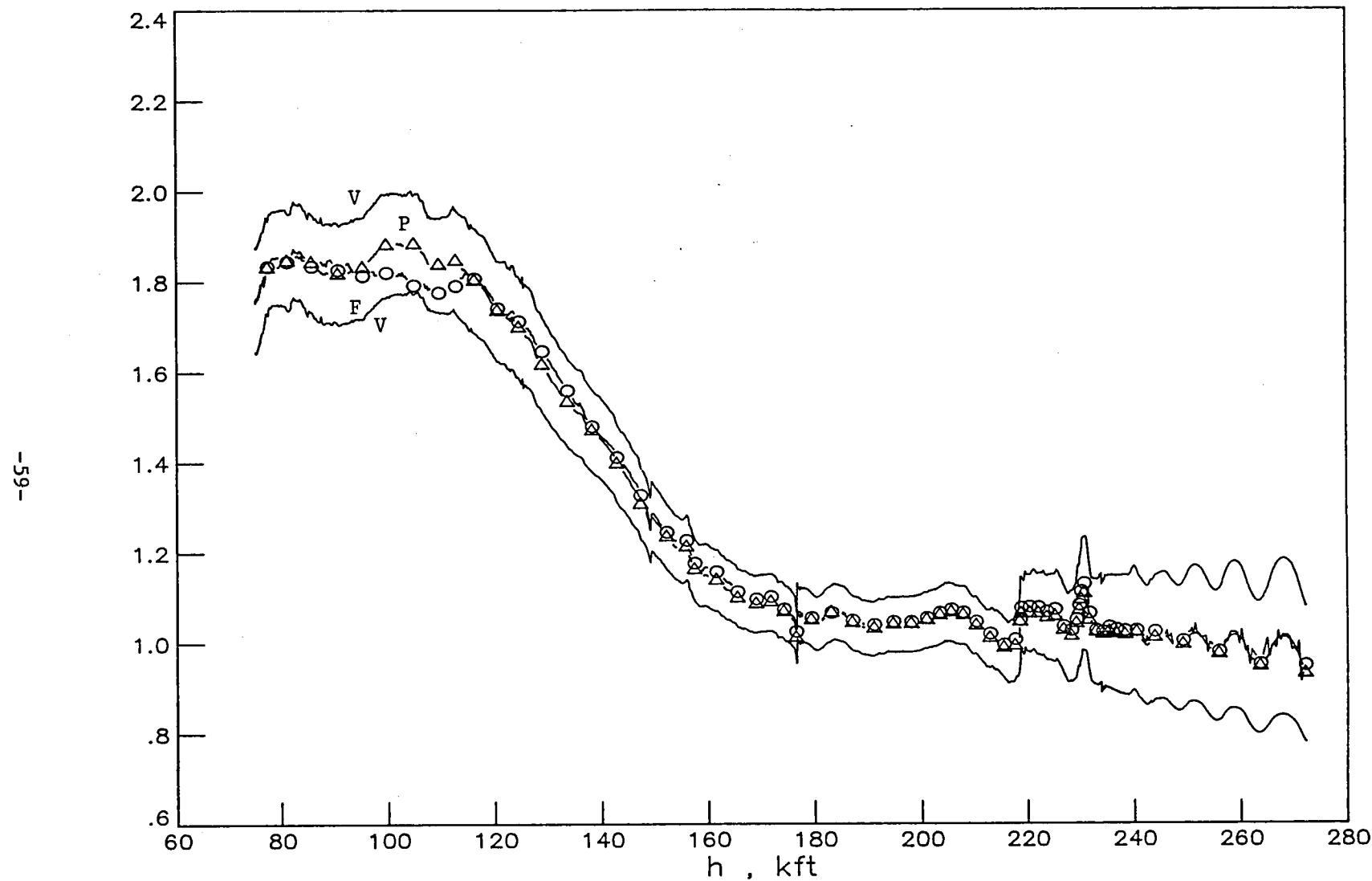


Figure III-18a. STS-9 L/D comparisons vs. altitude

L/D

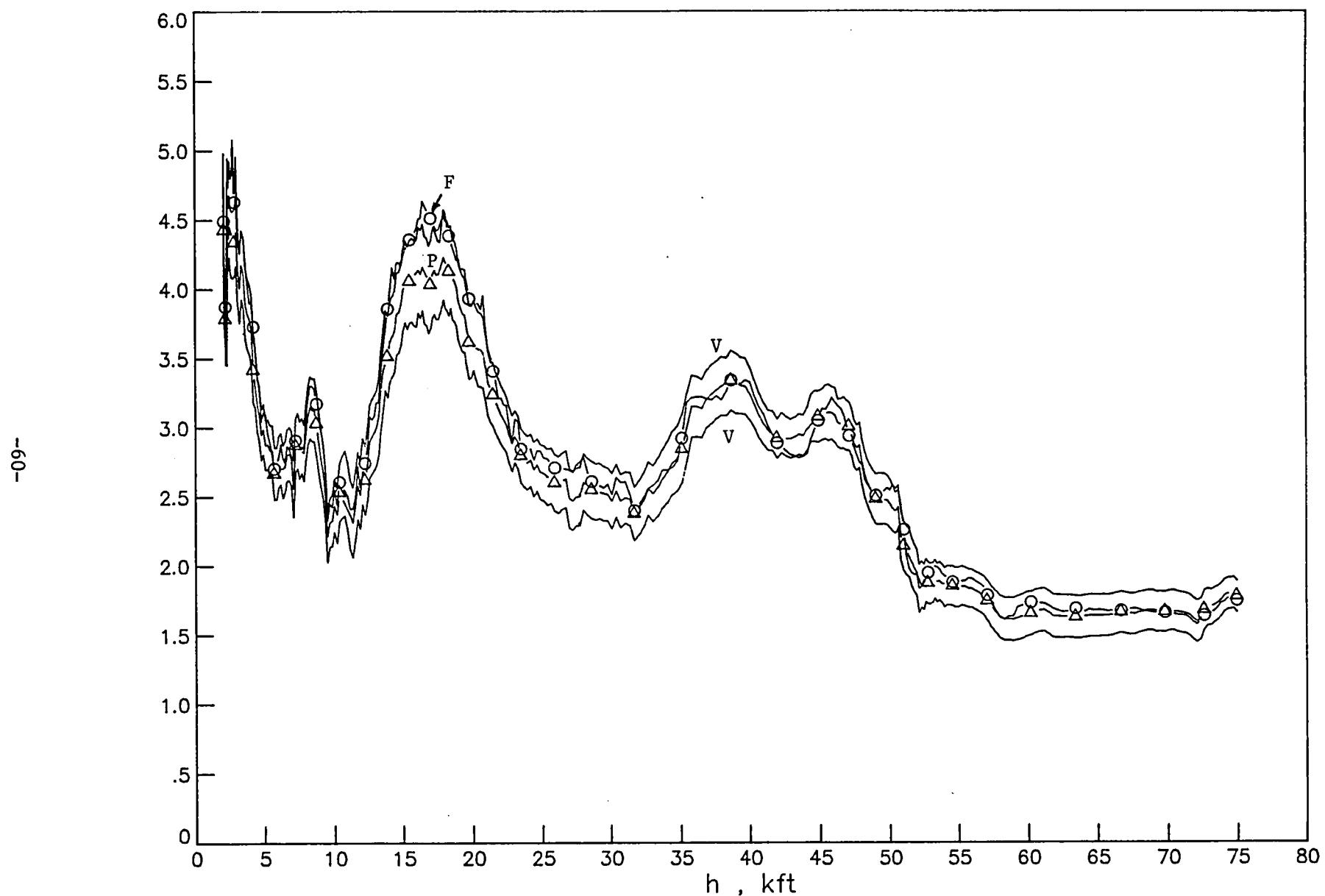


Figure III-18b. STS-9 L/D comparisons vs. altitude

C_L

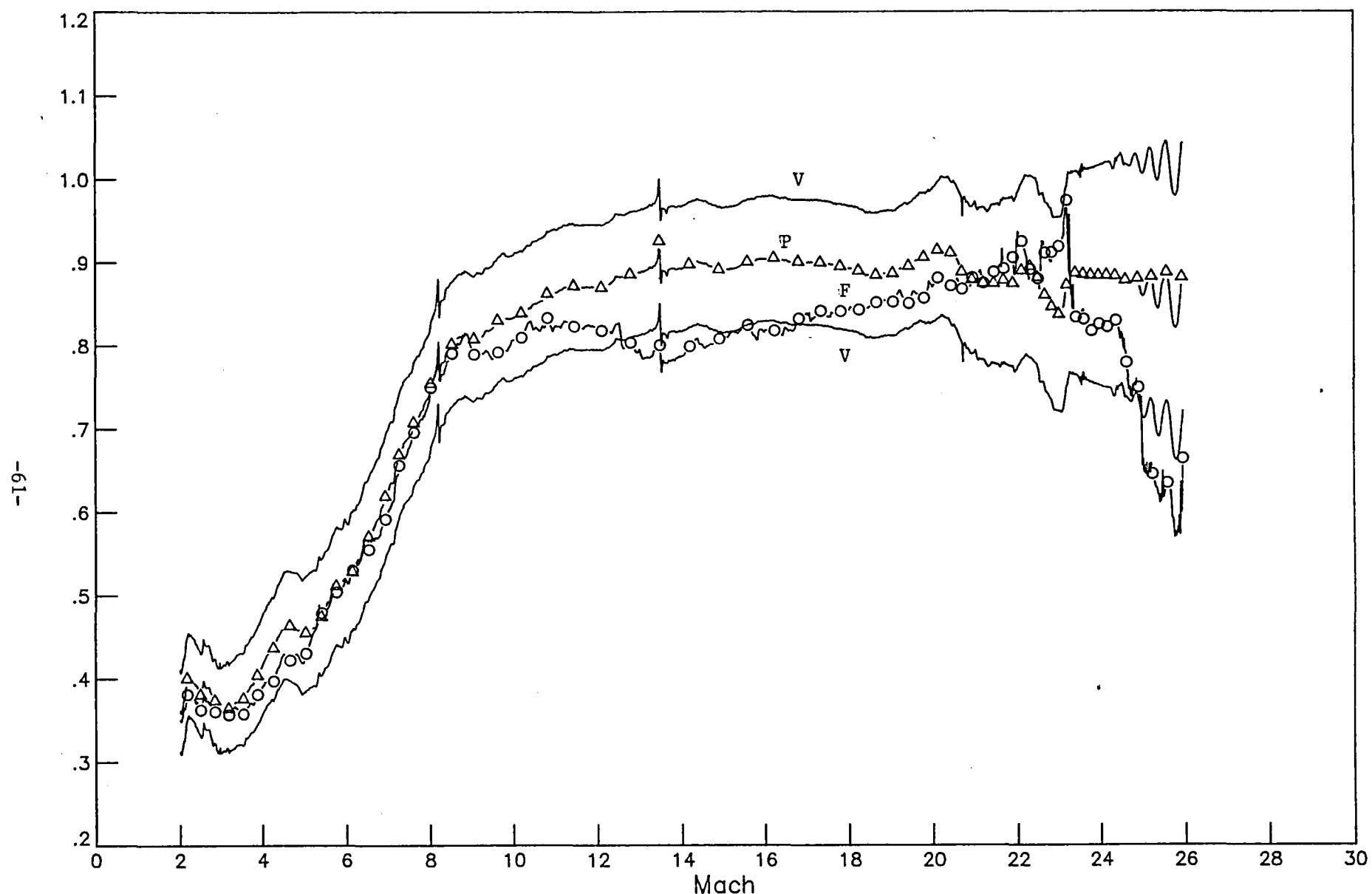


Figure III-19a. STS-9 lift comparisons vs. Mach

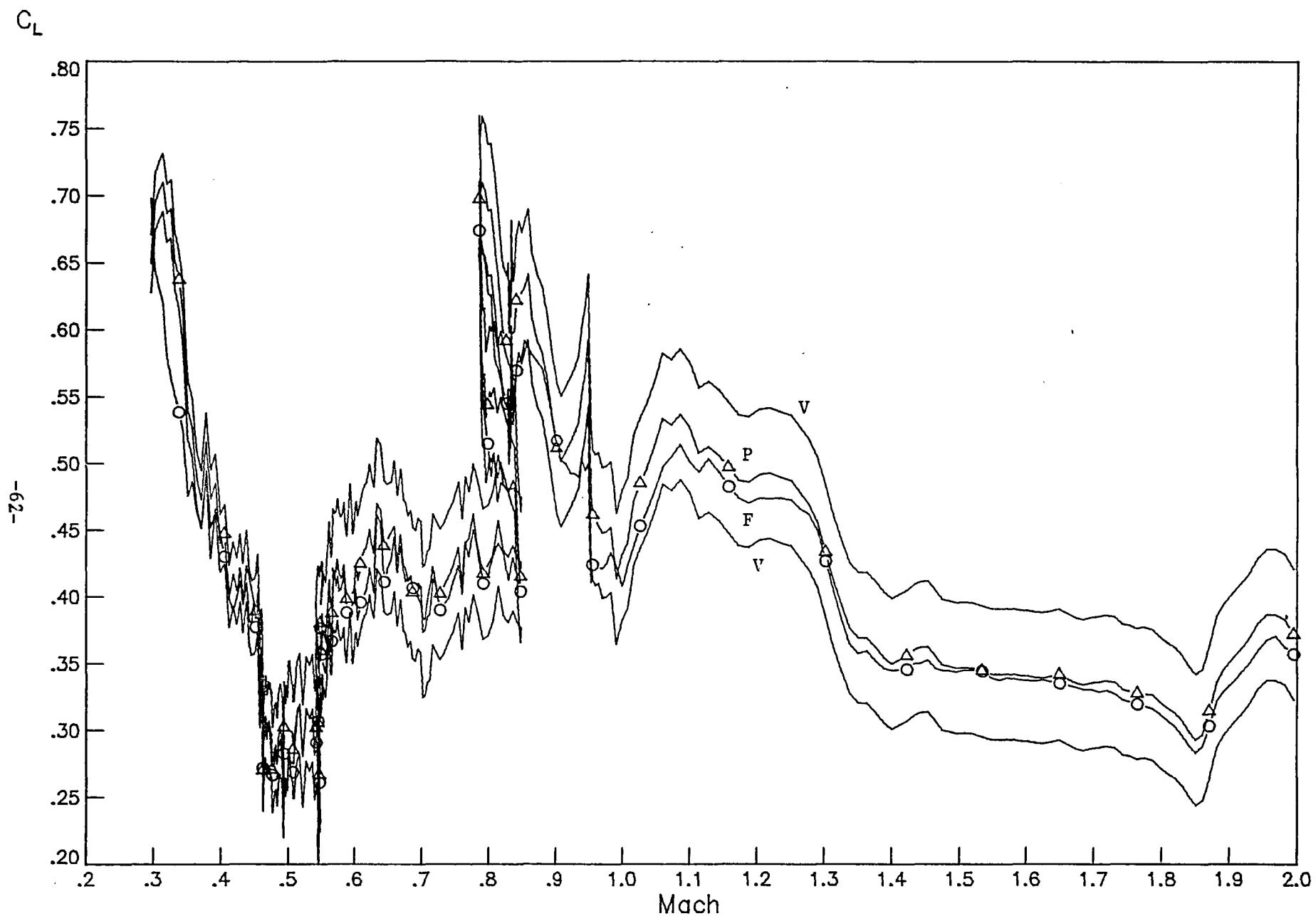


Figure III-19b. STS-9 lift comparisons vs. Mach

C_L

-63-

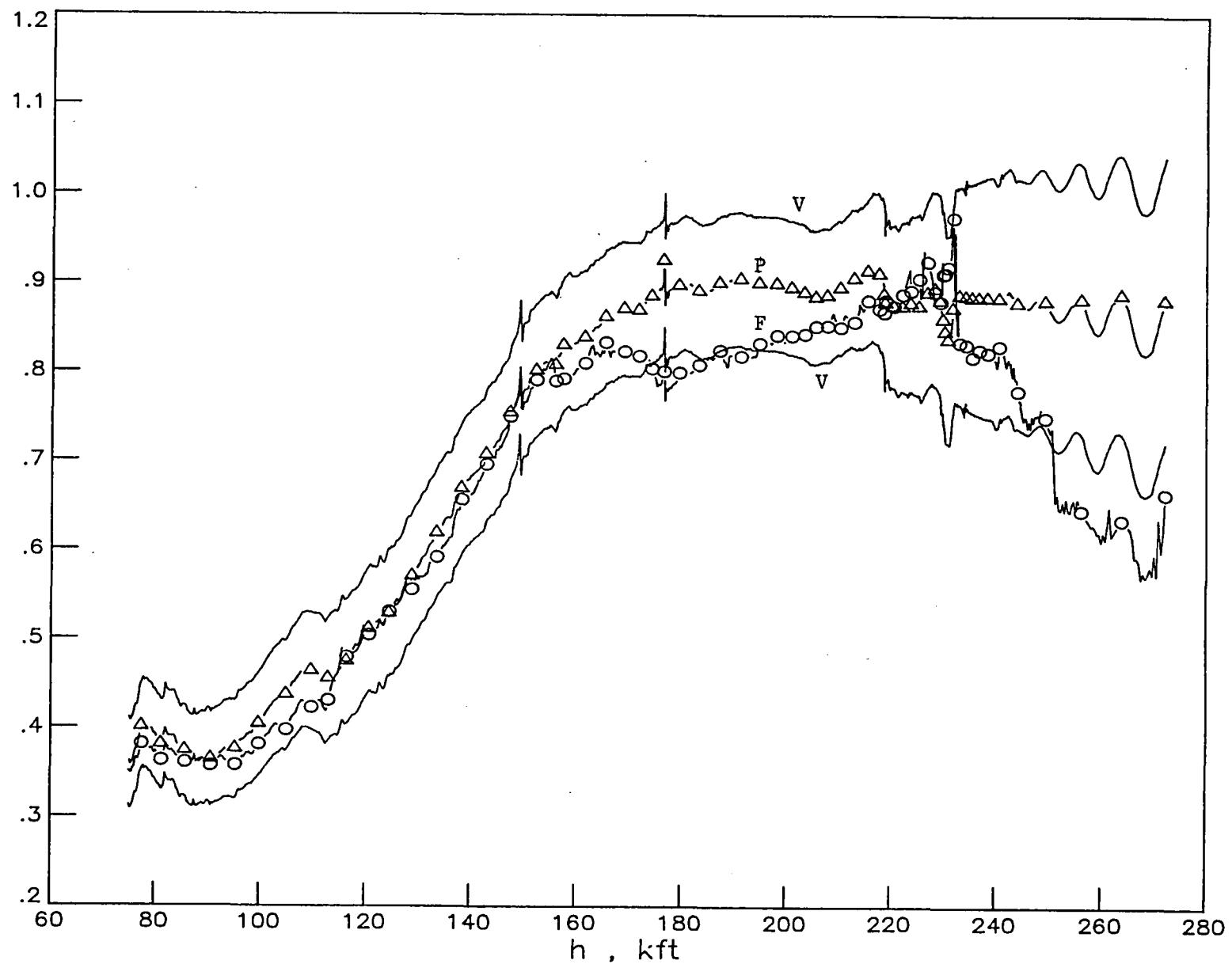


Figure III-20a. STS-9 lift comparisons vs. altitude

C_L

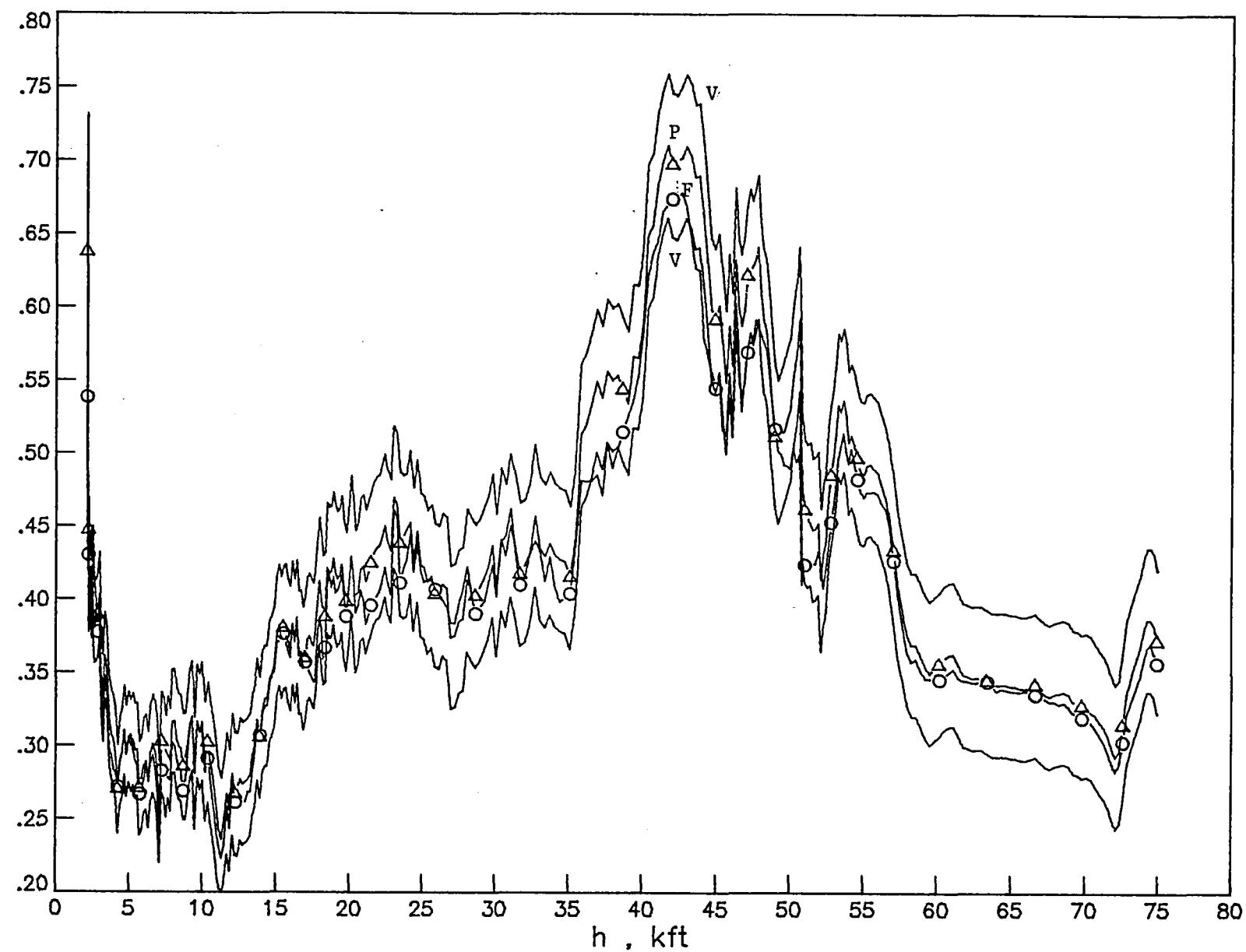


Figure III-20b. STS-9 lift comparisons vs. altitude

C_D

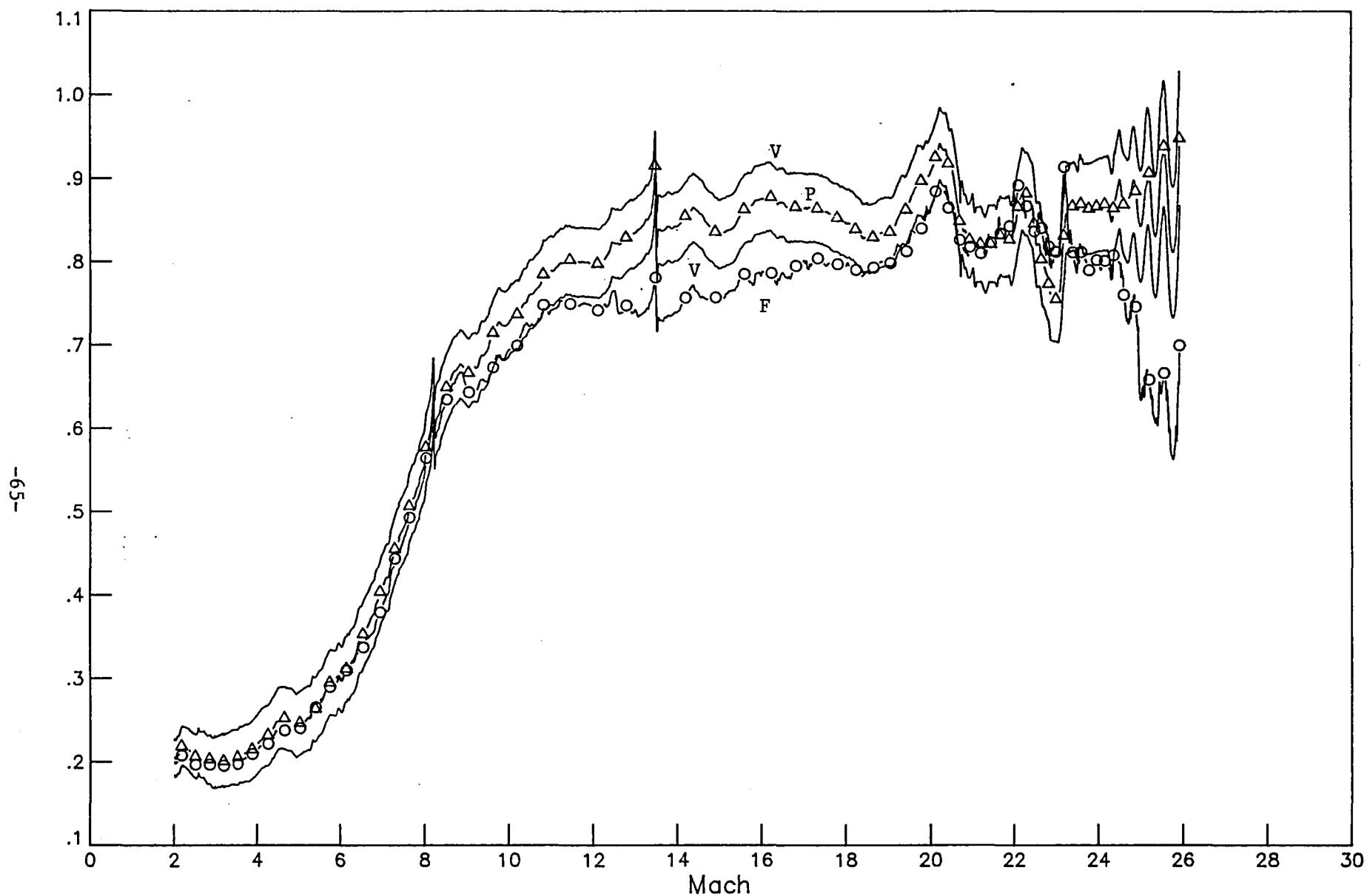


Figure III-21a. STS-9 drag comparisons vs. Mach

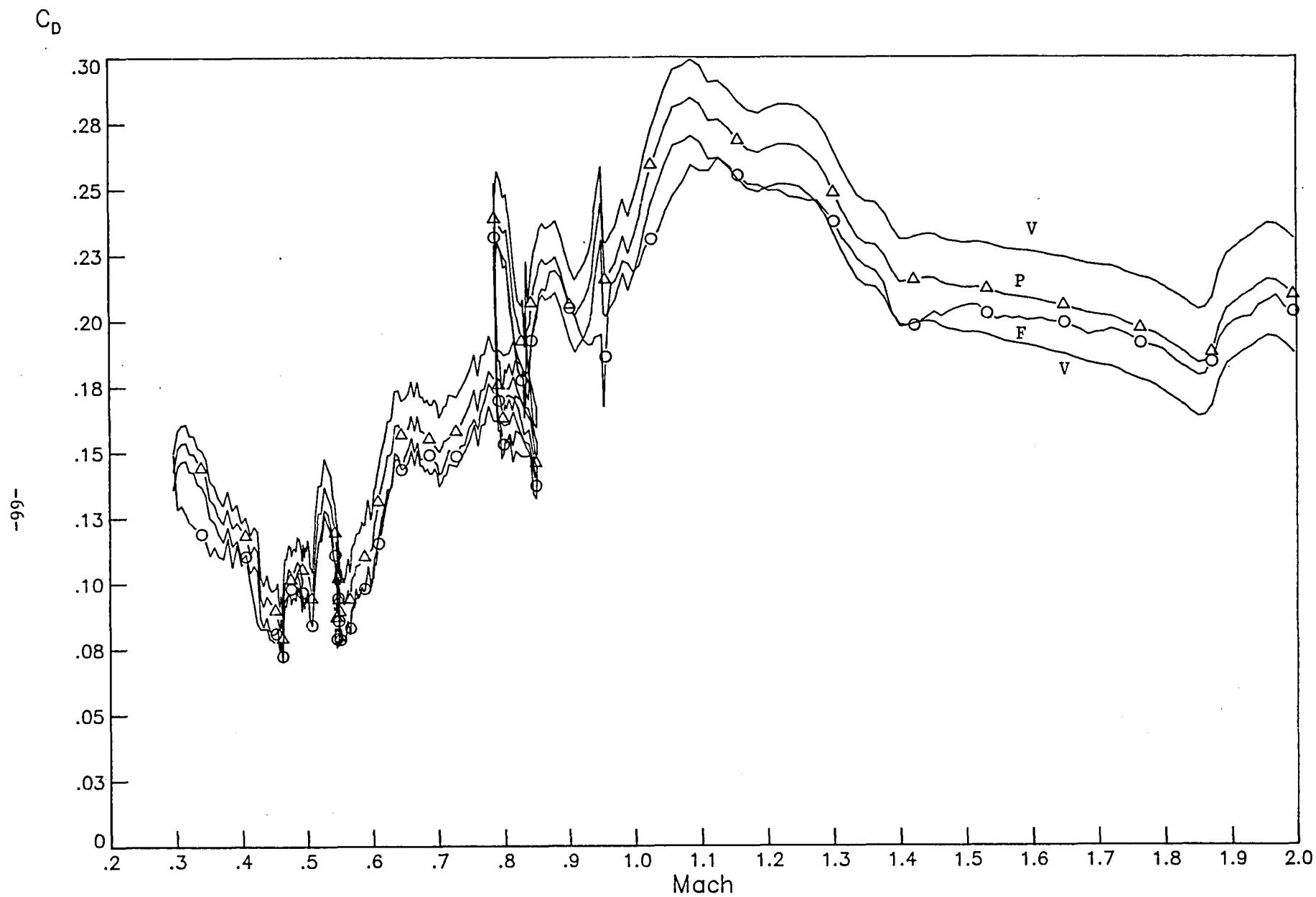


Figure III-21b. STS-9 drag comparisons vs. Mach

C_D

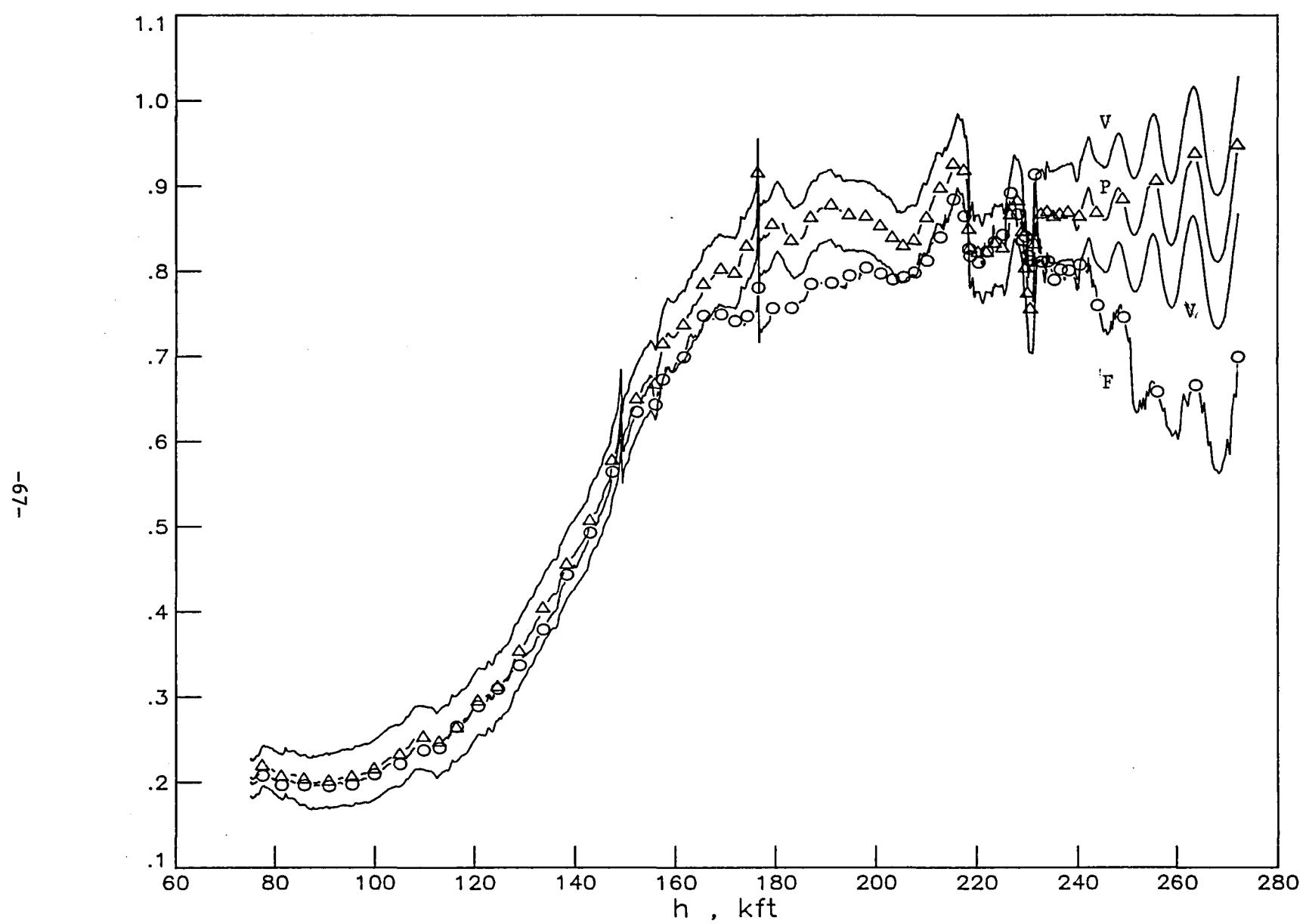


Figure III-22a. STS-9 drag comparisons vs. altitude

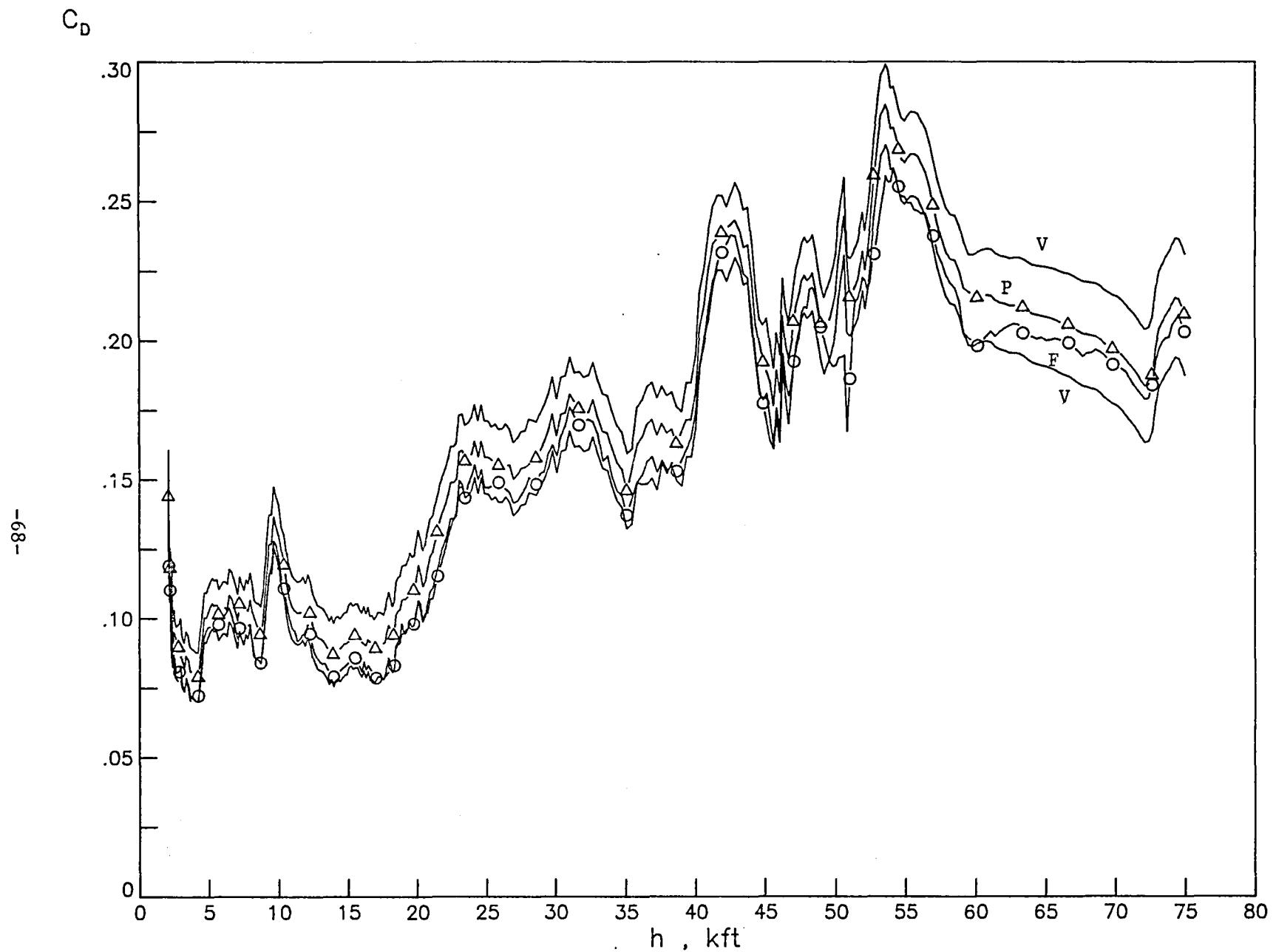
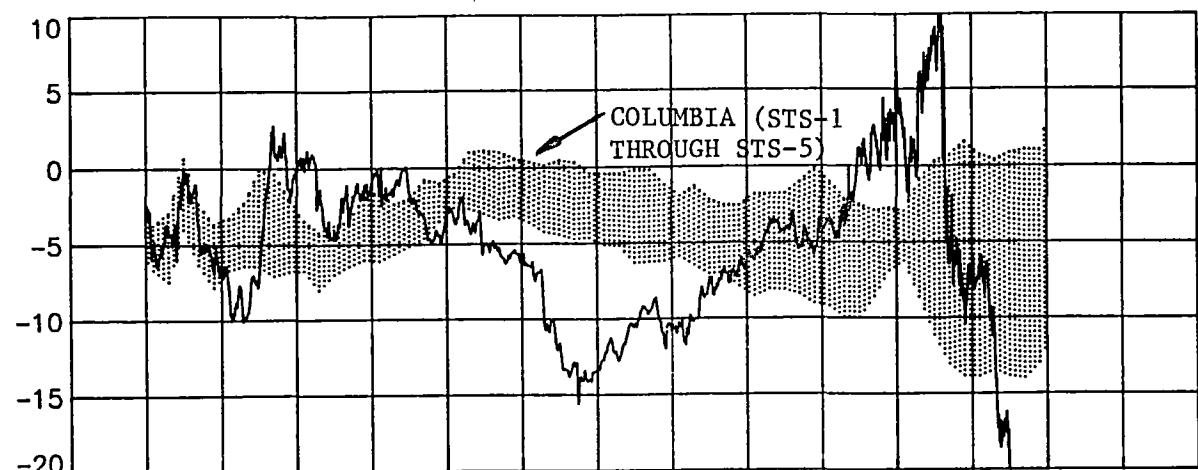
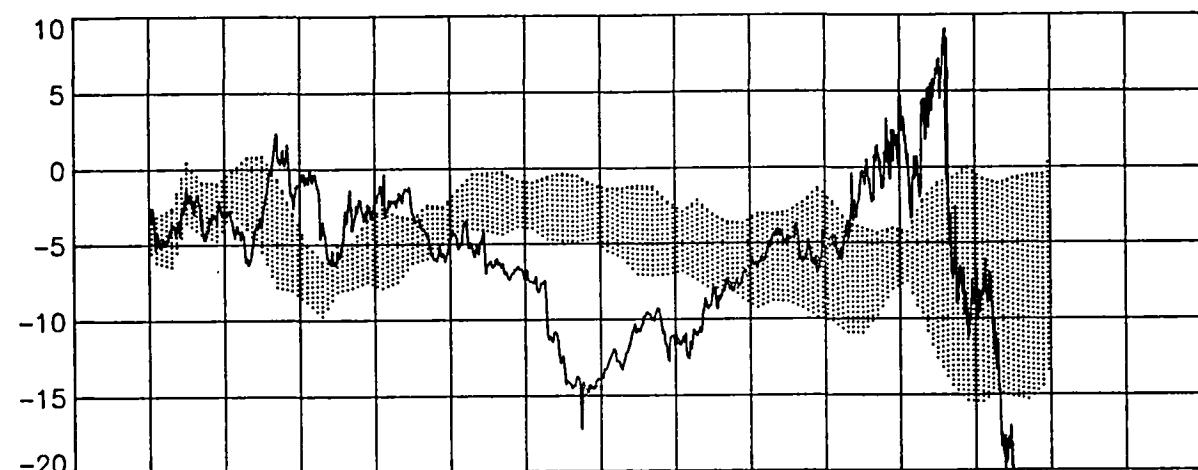


Figure III-22b. STS-9 drag comparisons vs. altitude

ΔC_L , percent



ΔC_D , percent



$\Delta(L/D)$, percent

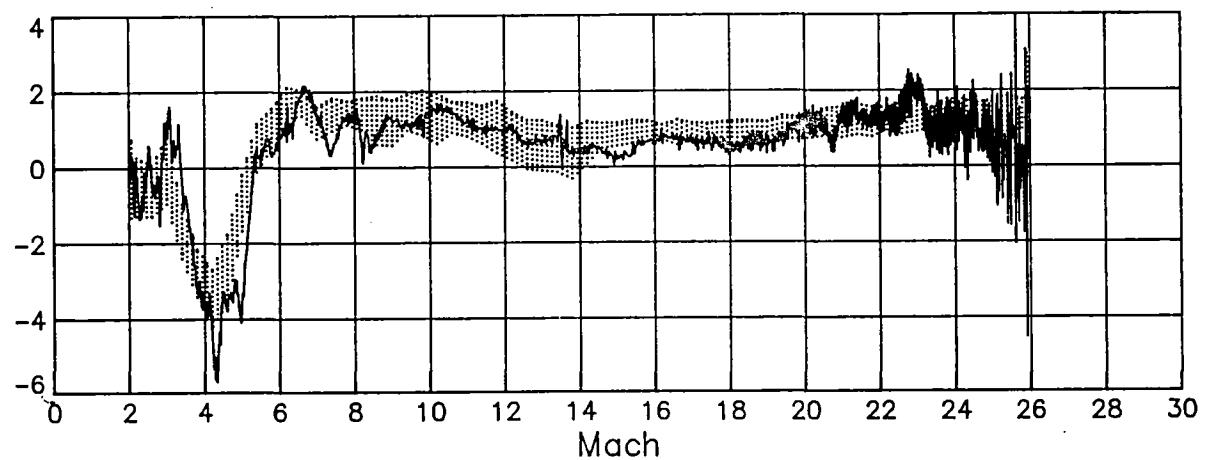
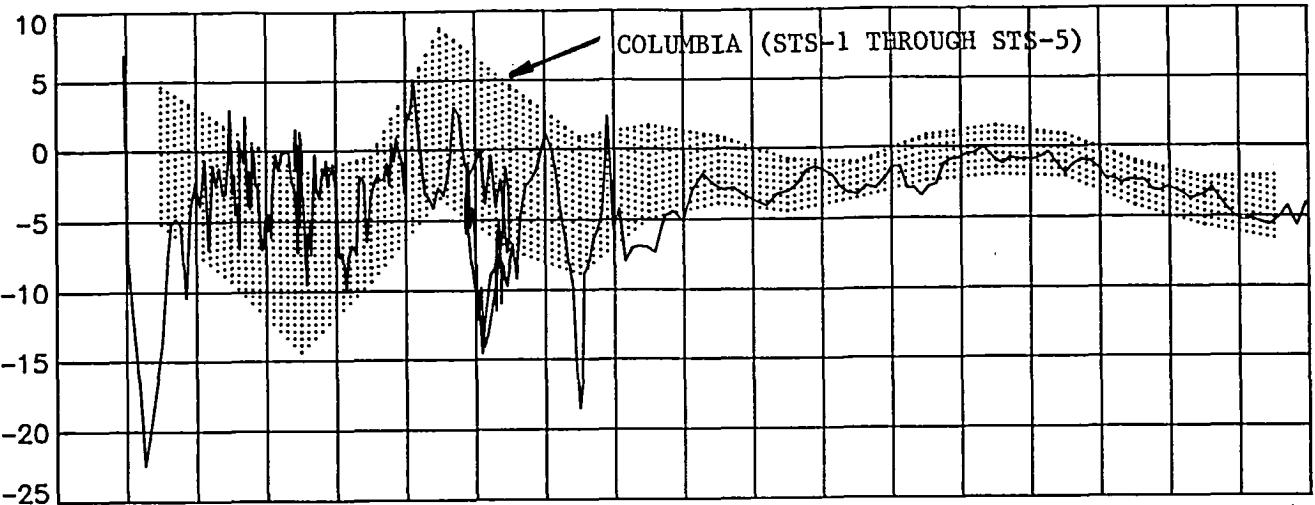
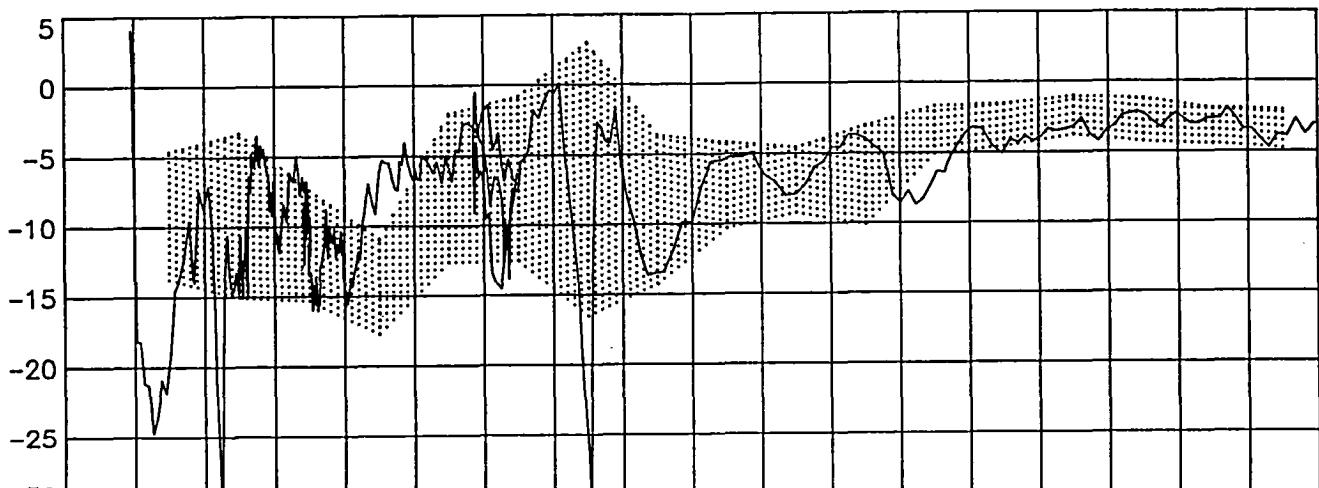


Figure III-23a. STS-9 flight/data base differences vs. Mach

ΔC_L , percent



ΔC_D , percent



$\Delta(L/D)$, percent

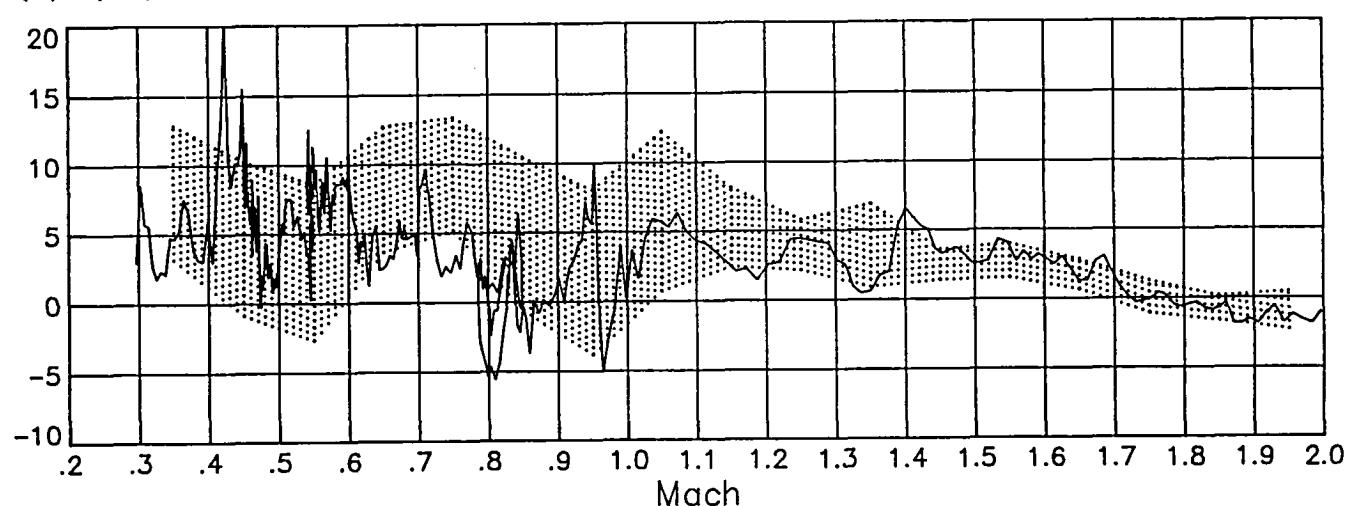
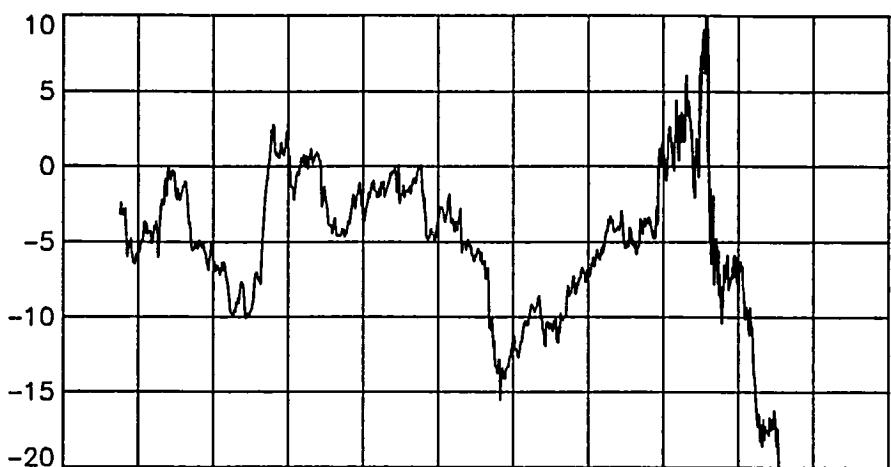
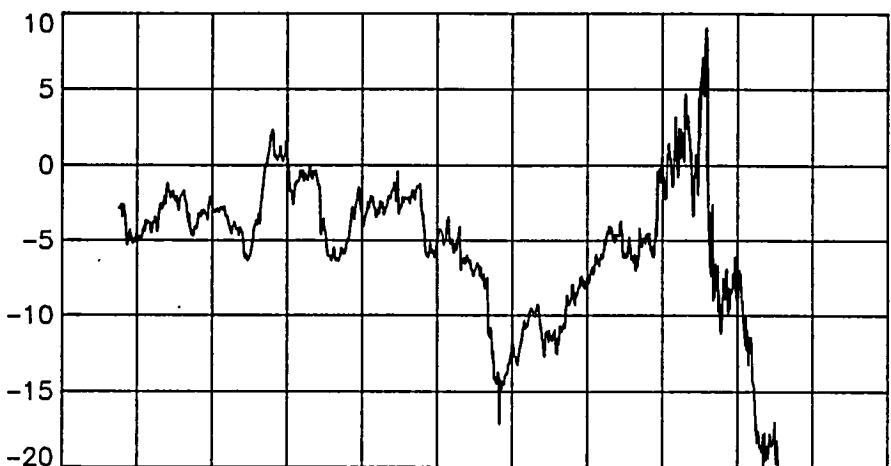


Figure III-23b. STS-9 flight/data base differences vs. Mach

ΔC_L , percent



ΔC_D , percent



$\Delta(L/D)$, percent

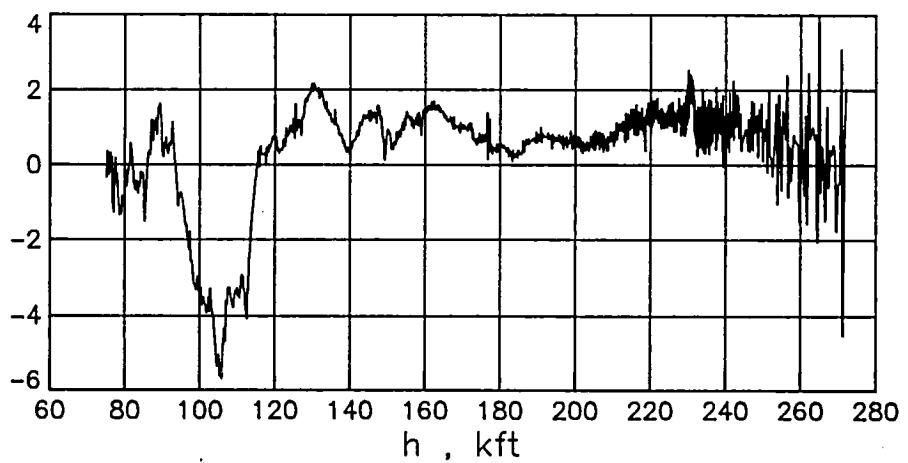
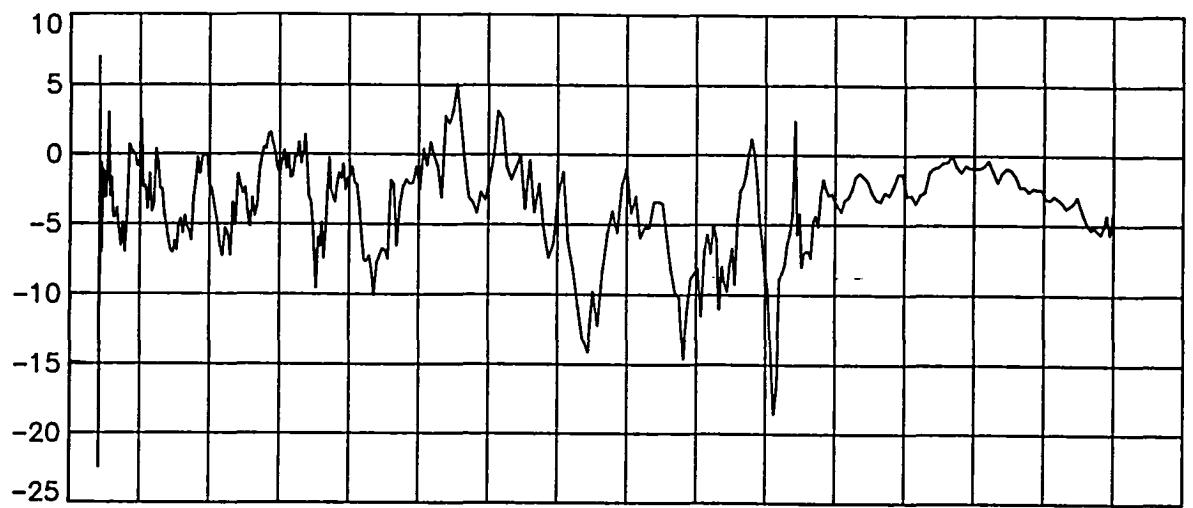
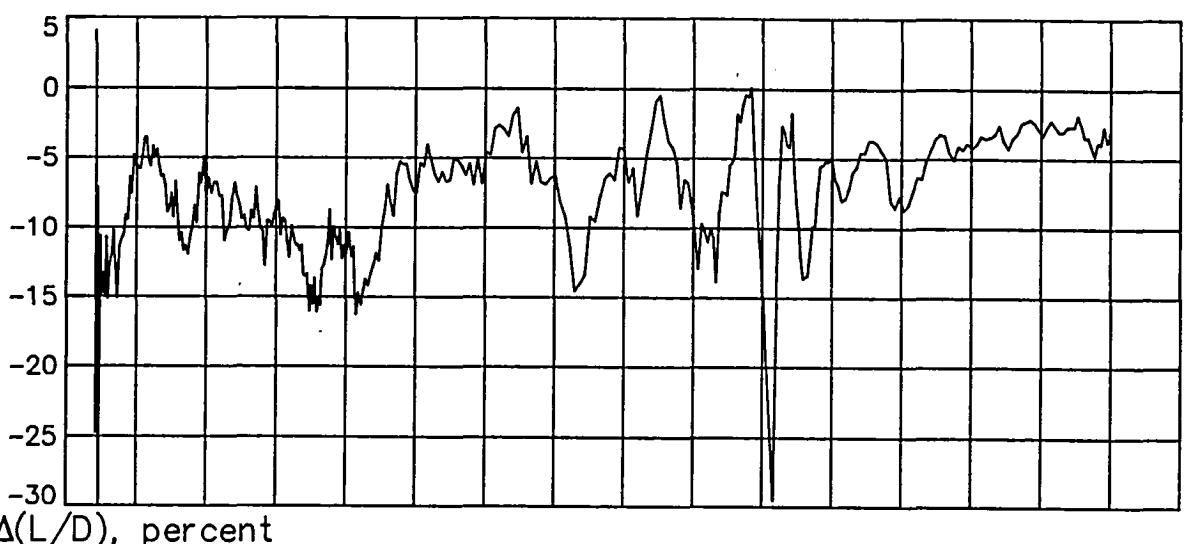


Figure III-24a. STS-9 flight/data base differences vs. h

ΔC_L , percent



ΔC_D , percent



$\Delta(L/D)$, percent

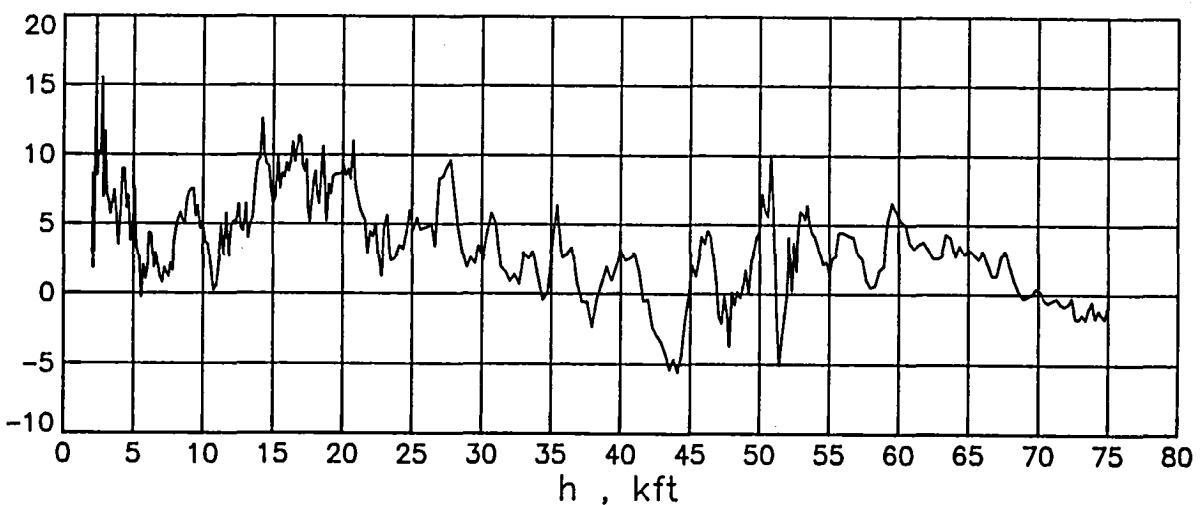


Figure III-24b. STS-9 flight/base differences vs. h

C_m

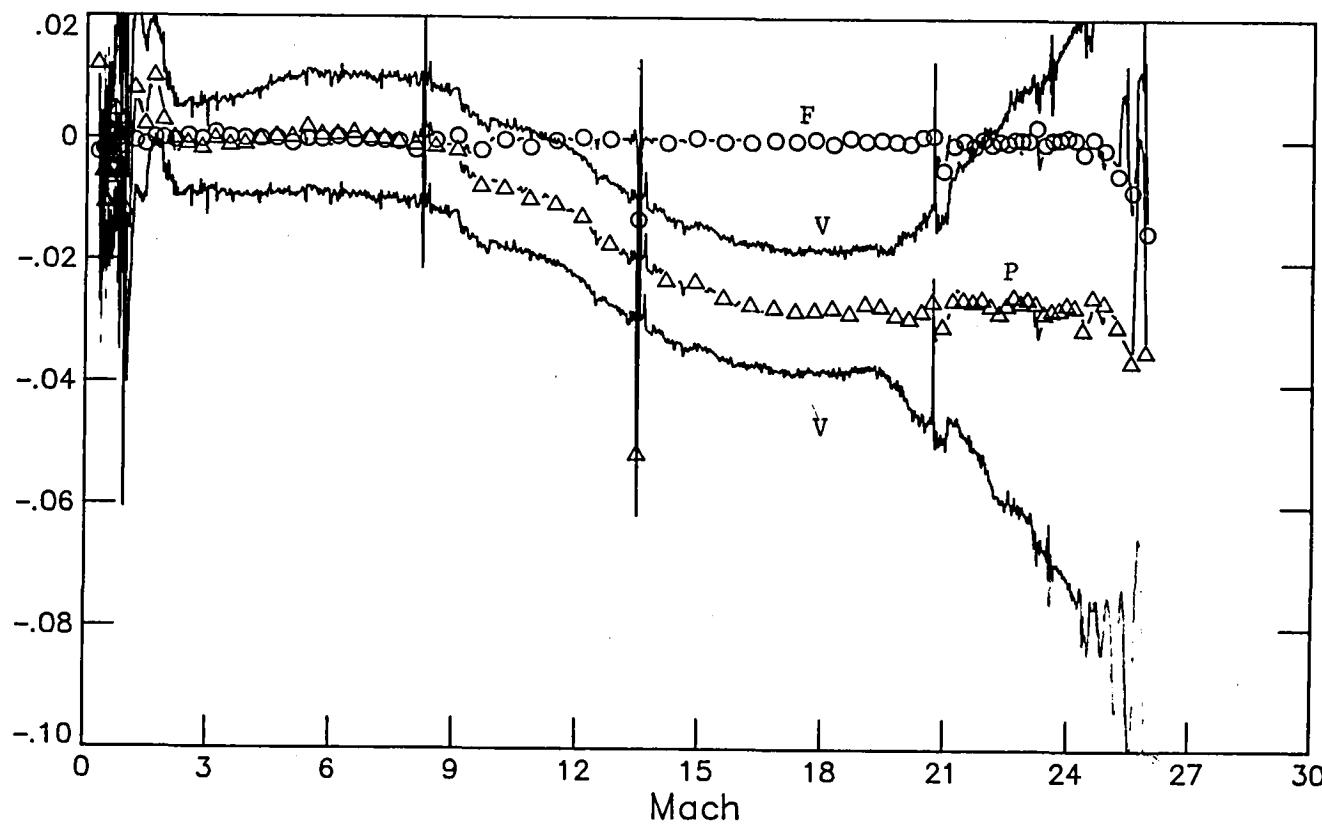


Figure III-25. STS-9 C_m comparisons vs. Mach

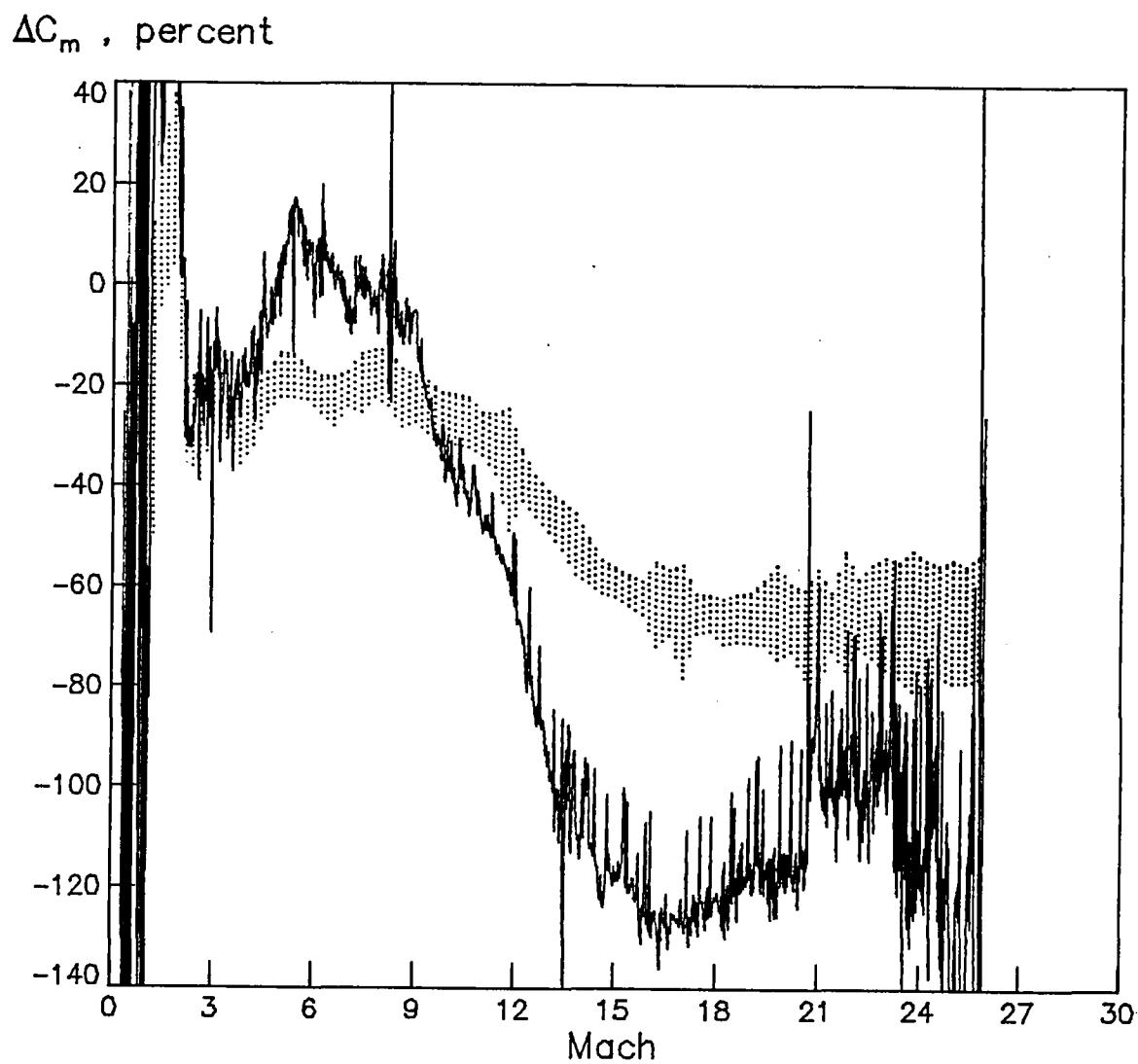


Figure III-26. ΔC_m comparisons vs. Mach

IV. MMLE input files

Spacecraft dynamics from IMU2 and ACIP measurements were used to generate STS-9 GTFILES. The 25 Hz IMU GTFILE, available on physical reel NL0606, was generated by direct integration of the equations of motion. The time spans from epoch (83843 sec) to 1750 seconds after epoch. Atmospheric data was obtained from the final LAIRS file FLAIR9, and control surface and RCS data were obtained directly from the 25 Hz OI-2 source tape NC0232.

The ACIP GTFILE containing 18 files (CDC System Records) was written onto reel ND1162. These 18 maneuver intervals are described in Table IV. The ACIP data utilized, on physical reel NK1117, were calibrated versus the IMU data. Also, the OI-2 data and FLAIR9 atmosphere utilized for the IMU2 GTFILE were incorporated.

Appendix A contains the mass properties (c.g., mass, and inertias) utilized.

LATERAL/DIRECTIONAL

INITIAL TIME	FINAL TIME	DESCRIPTION	FILE NO.	TSTART	TSTOP
$342^d 23^h 21^m 42^s$ $21^m 58^s$	$342^d 23^h 21^m 50^s$ $22^m 06^s$	1st Bank entry exit	1	255	285
$23^m 16^s$	$23^m 34^s$	PTI @ $q=23$ psf	2	350	375
$27^m 31^s$ $27^m 56^s$	$27^m 37^s$ $28^m 01^s$	2nd Bank entry exit	3	605	640
$32^m 56^s$	$33^m 01^s$	PTI @ M 14	4	930	945
$34^m 53^s$ $35^m 15^s$	$35^m 00^s$ $35^m 22^s$	3rd Bank entry exit	5	1045	1085
$35^m 44.5^s$ $35^m 50^s$	$35^m 53^s$ $36^m 06.5^s$	PTI jet, δ_A @ M9 incidental	6	1100	1145
$37^m 37^s$ $37^m 48^s$	$37^m 43^s$ $37^m 53^s$	PTI @ M6.3 incidental	7	1210	1235
$38^m 21^s$ $38^m 43^s$	$38^m 28^s$ $38^m 49^s$	4th Bank entry exit	8	1255	1290
$39^m 08^s$ $39^m 16^s$	$39^m 16^s$ $39^m 27^s$	PTI @ M4.4 incidental	9	1300	1325
$40^m 44^s$ $40^m 56^s$	$40^m 48^s$ $41^m 02^s$	5th Bank entry exit	10	1390	1425
$41^m 20^s$ $41^m 33^s$	$41^m 33^s$ $41^m 43^s$	PTI @ M2 incidental	11	1435	1470
$41^m 51^s$	$42^m 31^s$	$\frac{1}{4}$ Hz after δ_{SR} ramp	12	1465	1510
$42^m 46^s$	$42^m 56.5^s$	incidental δ_a	13	1520	1535
$43^m 20^s$	$43^m 26^s$	incidental δ_a (subsonic)	14	1555	1565

LONGITUDINAL

INITIAL TIME	FINAL TIME	DESCRIPTION	FILE NO.	TSTART	TSTOP
$342^d 23^h 20^m 08^s$	$342^d 23^h 20^m 28^s$	PTI	15	160	190
$20^m 34^s$ $20^m 57^s$	$20^m 51^s$ $21^m 07^s$	incidental	16	190	230
$33^m 00^s$ $33^m 03^s$	$33^m 04^s$ $33^m 06^s$	PTI δ_{BF}	(INCLUDED IN 4 ABOVE)		
$35^m 03.5^s$	$35^m 14^s$	δ_{BF}	17	1055	1075
$35^m 52^s$ $36^m 00.5^s$ $36^m 21^s$	$35^m 56^s$ $36^m 10.5^s$ $36^m 24^s$	PTI δ_{BF} δ_{BF}	(INCLUDED IN 6 ABOVE)		

TABLE IV. Specified ACIP maneuver files for STS-9

LONGITUDINAL (continued)

INITIAL TIME	FINAL TIME	DESCRIPTION	FILE NO.	TSTART	TSTOP
$342^d 23^h 40^m 38.5^s$ $40^m 55.5^s$	$342^d 23^h 40^m 44^s$ $40^m 59^s$	PTI incidental δ_e , δ_{RF} , also δ_a	(INCLUDED IN 10 ABOVE)		
$41^m 43^s$	$41^m 47^s$	PTI	(INCLUDED IN 11 ABOVE)		
$42^m 26^s$	$42^m 30^s$	PTI	18	1500	1510

TABLE IV. (Concluded).

APPENDIX A
Spacecraft and Physical Constants

+++++IMU NBR 2 ATTITUDE INFORMATION++++

...INERTIAL (EE50) TO ROTATING (ETOD)		
.40583355E+00	.91394605E+00	-.13216400E-02
-.91394118E+00	.40583570E+00	.29849788E-02
.32644783E-02	-.35032760E-05	.99999467E+00
...ROTATING (ETOD) TO N-E-D		
.65578673E+00	-.42972520E+00	.62070929E+00
-.54809036E+00	-.83641913E+00	0.
.51917312E+00	-.34020478E+00	-.78404080E+00
...NAV BASE TO S/C BODY		
.98295650E+00	.43633230E-03	-.18383790E+00
-.45295080E-03	.99999990E+00	-.48404800E-04
.18383790E+00	.13084930E-03	.98295660E+00
...NAV BASE TO OUTER ROLL		
.99999790E+00	.19876000E-02	-.56930000E-03
-.19876000E-02	.99999800E+00	-.63000000E-05
.56930000E-03	.75000000E-05	.9999980E+00
...PLATFORM TO OUTER ROLL		
.99822326E+00	.31356559E-01	.50666389E-01
-.30371649E-02	-.82244440E+00	.56883502E+00
.59507078E-01	-.56797823E+00	-.82088789E+00
...INERTIAL (EE50) TO PLATFORM		
.49205178E+00	-.61770582E+00	.61345226E+00
-.23550844E+00	.58393657E+00	.77686694E+00
-.83810520E+00	-.52674174E+00	.14185178E+00
...S/C BODY TO N-E-D		
.36952392E+00	-.86450058E+00	.34071689E+00
.67473849E+00	.50173968E+00	.54127986E+00
-.63888879E+00	.29879104E-01	.76871639E+00

TABLE A-1

STS-9 IMU attitude matrices @ Epoch

+++++IMU NBR 3 ATTITUDE INFORMATION++++

...INERTIAL (EE50) TO ROTATING (ETOD)		
.40583355E+00	.91394605E+00	-.13216400E-02
-.91394118E+00	.40583570E+00	.29849788E-02
.32644783E-02	-.35032760E-05	.99999467E+00
...ROTATING (ETOD) TO N-E-D		
.65578673E+00	-.42972520E+00	.62070929E+00
-.54809036E+00	-.83641913E+00	0.
.51917312E+00	-.34020478E+00	-.78404080E+00
...NAV BASE TO S/C BODY		
.98295650E+00	.43633230E-03	-.18383790E+00
-.45295080E-03	.99999990E+00	-.48404800E-04
.18383790E+00	.13084930E-03	.98295660E+00
...NAV BASE TO OUTER ROLL		
.99999189E+00	.40173395E-02	-.28226975E-03
-.40173345E-02	.99999193E+00	.18318687E-04
.28234106E-03	-.17184567E-04	.99999996E+00
...PLATFORM TO OUTER ROLL		
.30372214E+00	.72394038E+00	-.61940536E+00
-.26950214E+00	-.55828641E+00	-.78465564E+00
.91384970E+00	.40524831E+00	.25539709E-01
...INERTIAL (EE50) TO PLATFORM		
-.56709075E+00	-.39331800E-01	.82271528E+00
.82321101E+00	.57236200E-02	.56770593E+00
-.27037870E-01	.99920958E+00	.29132260E-01
...S/C BODY TO N-E-D		
.36919080E+00	-.86458968E+00	.34085398E+00
.67451536E+00	.50158563E+00	.54170114E+00
-.63931735E+00	.29919863E-01	.76836031E+00

TABLE A-1

(Concluded).

Planet Parameters

Physical Model

Polar Radius:	20,855,591.48 ft
Equatorial Radius:	20,925,741.47 ft
Rotational Rate:	.7292115147E-4 rad/sec

Gravity Model

Central mass, μ :	.1407646853E17 ft ³ /sec ²
J_2 :	.10827E-2
C_{30} :	.256E-5
C_{40} :	.158E-5
C_{22} :	.157E-5
S_{22} :	-.897E-6

Runway 17 Location:

Altitude:	2090. ft (above ellipsoid)
Geodetic Latitude:	34.930885 deg
Longitude:	242.163116 deg
Azimuth:	190.072211 deg

Location of IMU relative to center-of-gravity in Body coordinates

(Assumed constant for entry reconstruction)

X_B	56 ft
Y_B	0.0 ft
Z_B	-4 ft

Spacecraft aerodynamic reference parameters

Reference Area	2690 ft ²
Span	78.057 ft
Chord	39.567 ft

Average Attitude Computations @ Epoch (83843 sec)

	<u>IMU2</u>	<u>IMU3</u>	<u>μ</u>	<u>σ</u>
ψ (deg)	61.2925	61.3062	61.2994	0.0097
θ (deg)	39.7091	39.7409	39.7250	0.0225
ϕ (deg)	2.2259	2.2300	2.2279	0.0029

TABLE A-2

Planet and Spacecraft Data Used for
BET9J13, STS9BET, and AEROBET Generation

Weight and Center-of-Gravity (c.g.) Location

<u>TIME</u> (sec from epoch)	<u>EVENT</u> * _____	<u>WEIGHT</u> (lbs)	<u>X_{CG}</u> (inches in Orbiter Structural Reference)	<u>Y_{CG}</u>	<u>Z_{CG}</u>
0	ENTRY	221143.4	1087.3	-0.1	373.7
1391.	MACH 3	220288.4	1085.8	-0.1	373.2
1800.	LANDING	220027.4	1087.1	-0.1	370.7

Moments and Products of Inertia

<u>TIME</u> (sec from epoch)	<u>EVENT</u> * _____	<u>I_{XX}</u>	<u>I_{YY}</u>	<u>I_{ZZ}</u> slug - ft ²	<u>I_{XY}</u>	<u>I_{XZ}</u>	<u>I_{YZ}</u>
0	ENTRY	941896.9	7091395.2	7399084.3	-5695.5	161504.6	774.7
1391.	MACH 3	937236.5	7056375.6	7365931.7	-5558.8	151812.6	746.0
1800.	LANDING	966421.4	7076082.9	7360569.9	-5660.2	144046.0	672.5

*MACH 3 values held constant until gear deploy (t = 1780),
landed values adopted thereafter.

TABLE A-3

STS-9 mass properties

APPENDIX B

Final residuals for STS-9 trajectory reconstruction

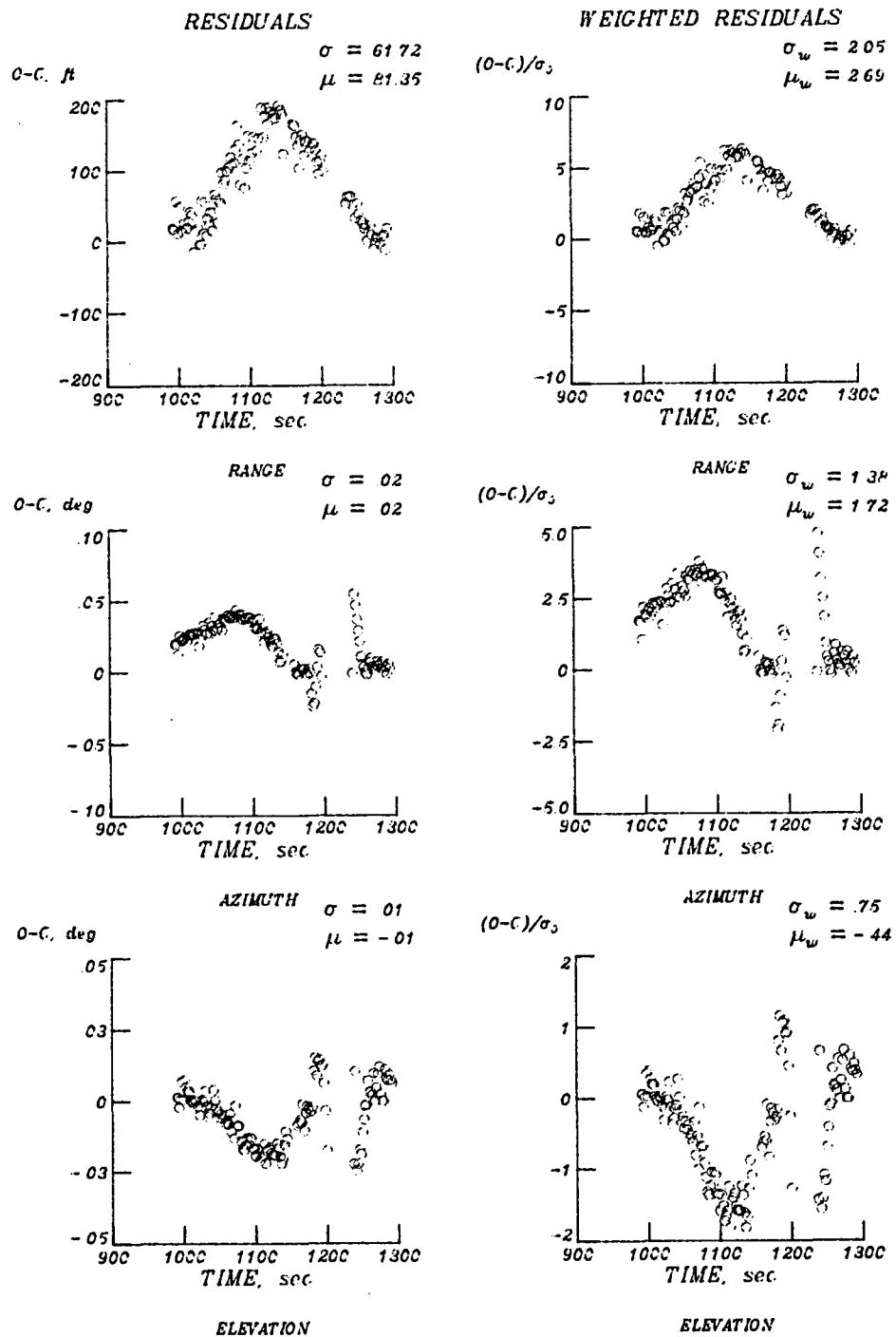


Figure B-1. Smoothed residuals versus time for PTPC.

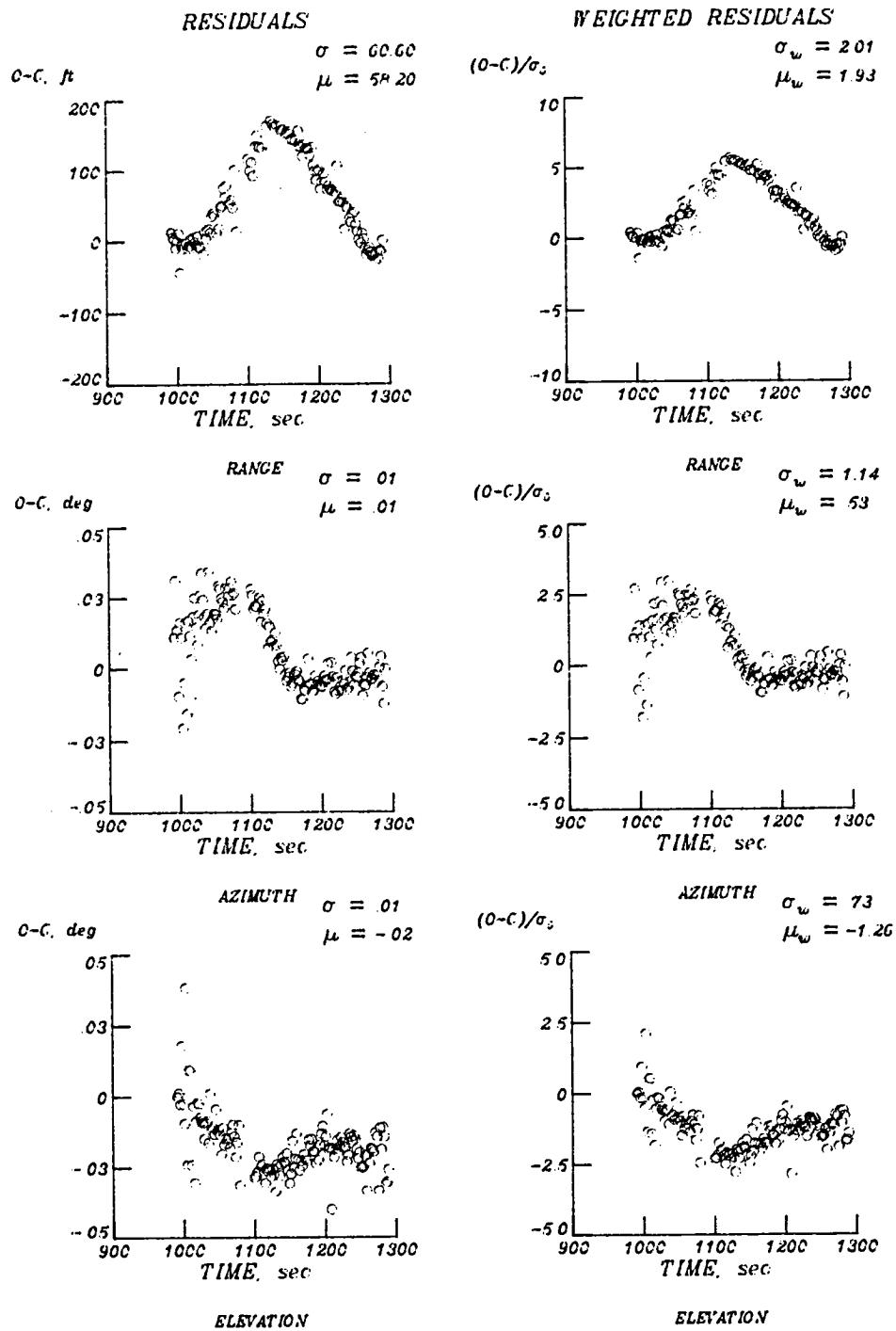


Figure B-2. Smoothed residuals versus time for PPTC.

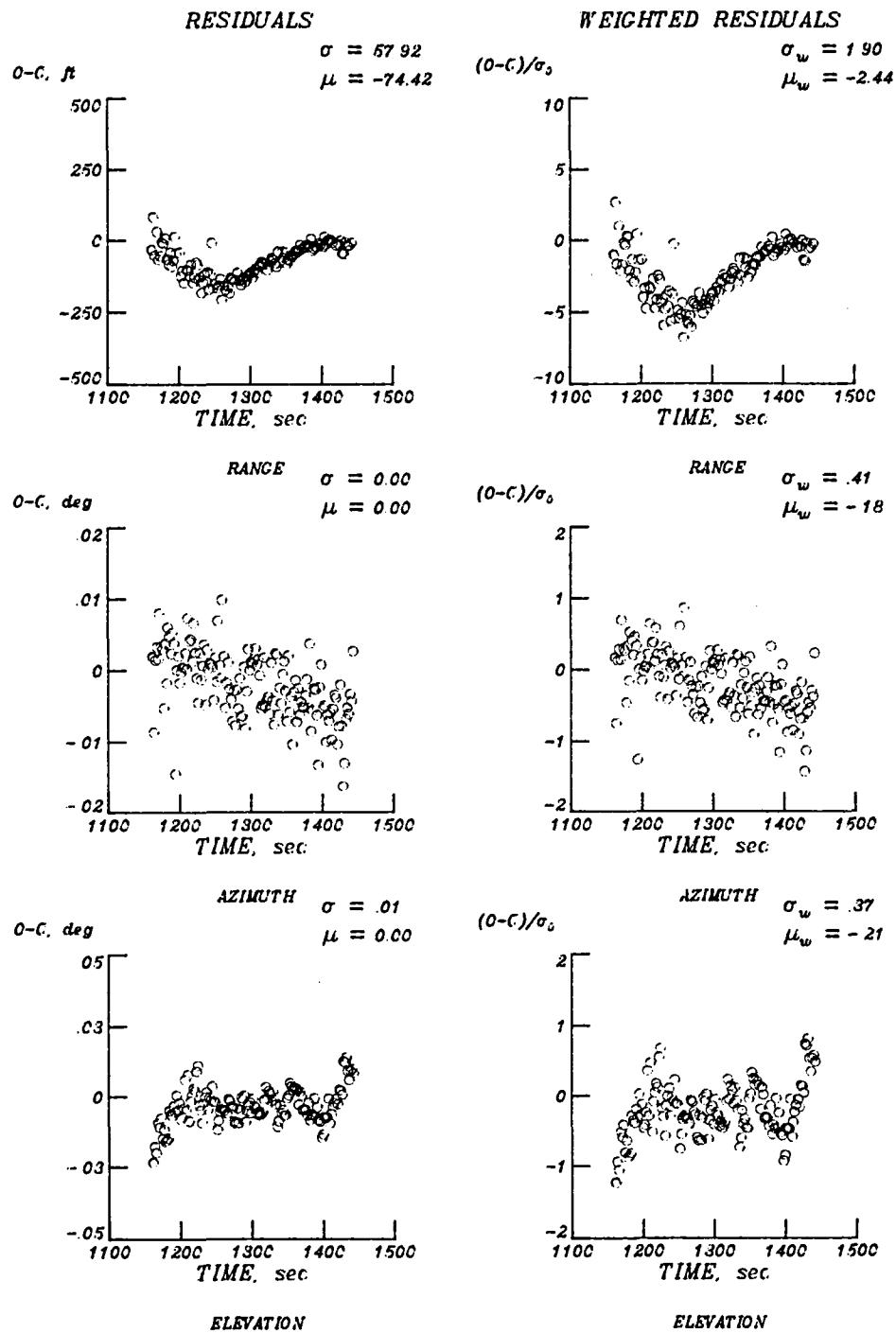


Figure B-3. Smoothed residuals versus time for VDBC.

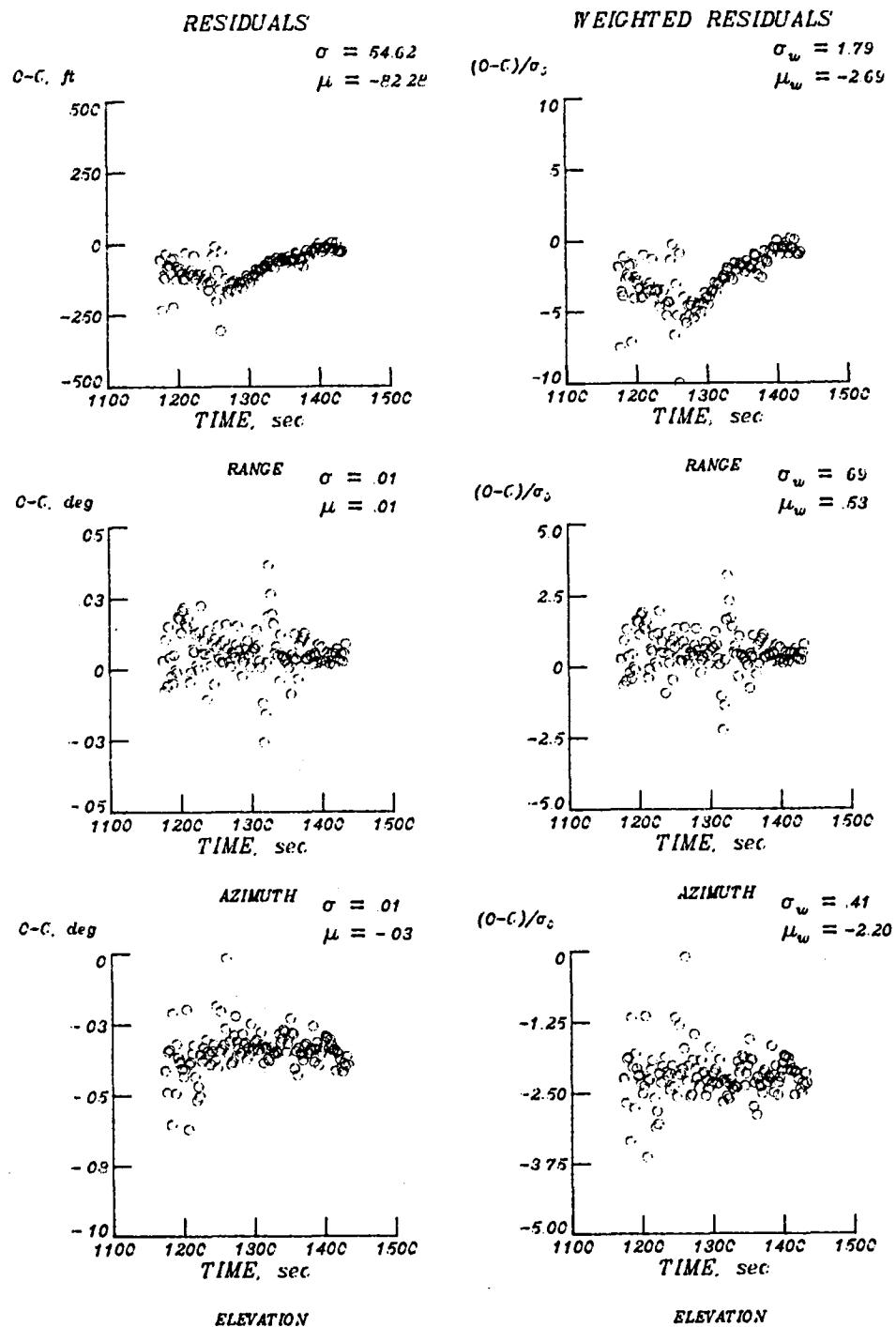


Figure B-4. Smoothed residuals versus time for VDSC.

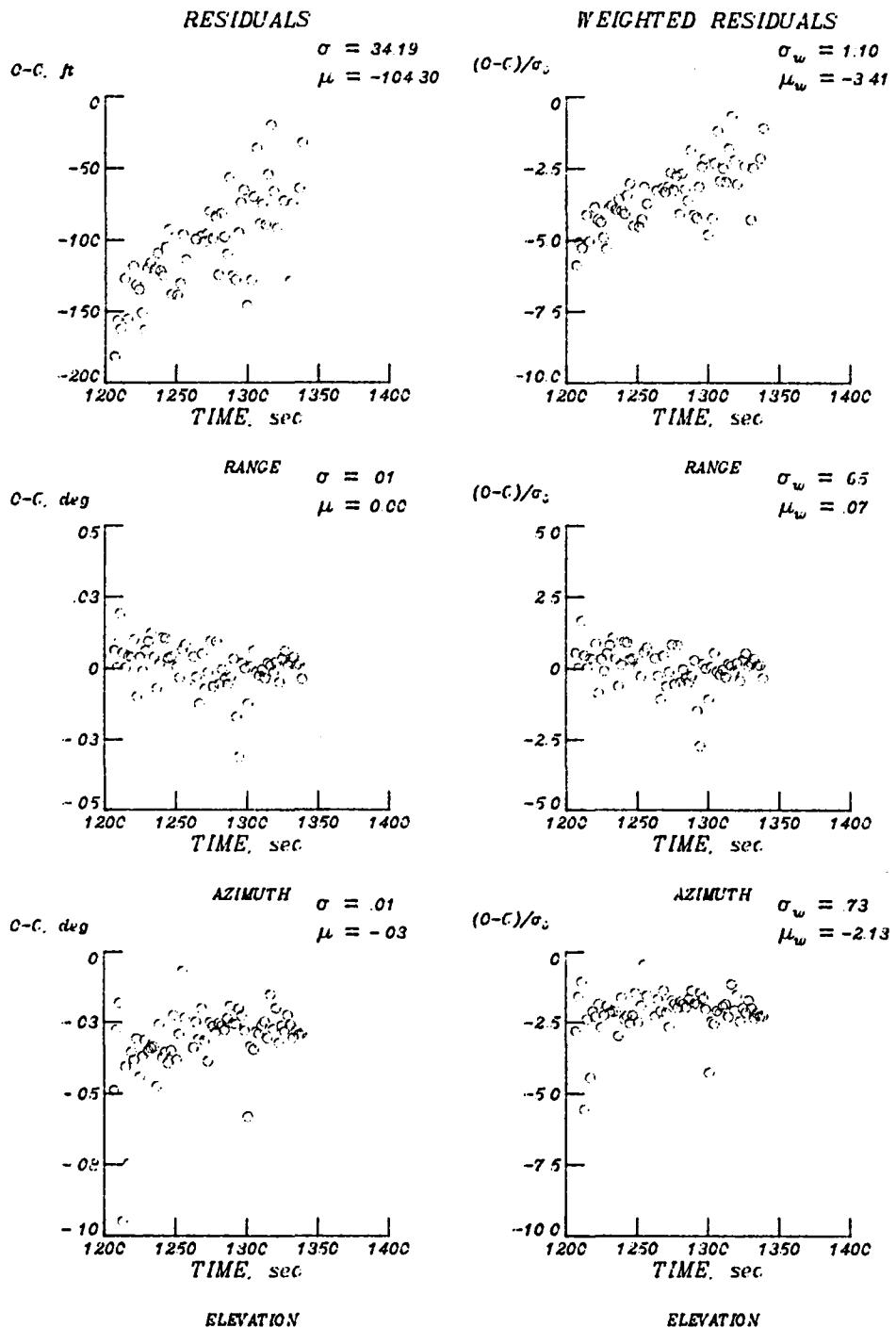


Figure B-5. Smoothed residuals versus time for FRCC.

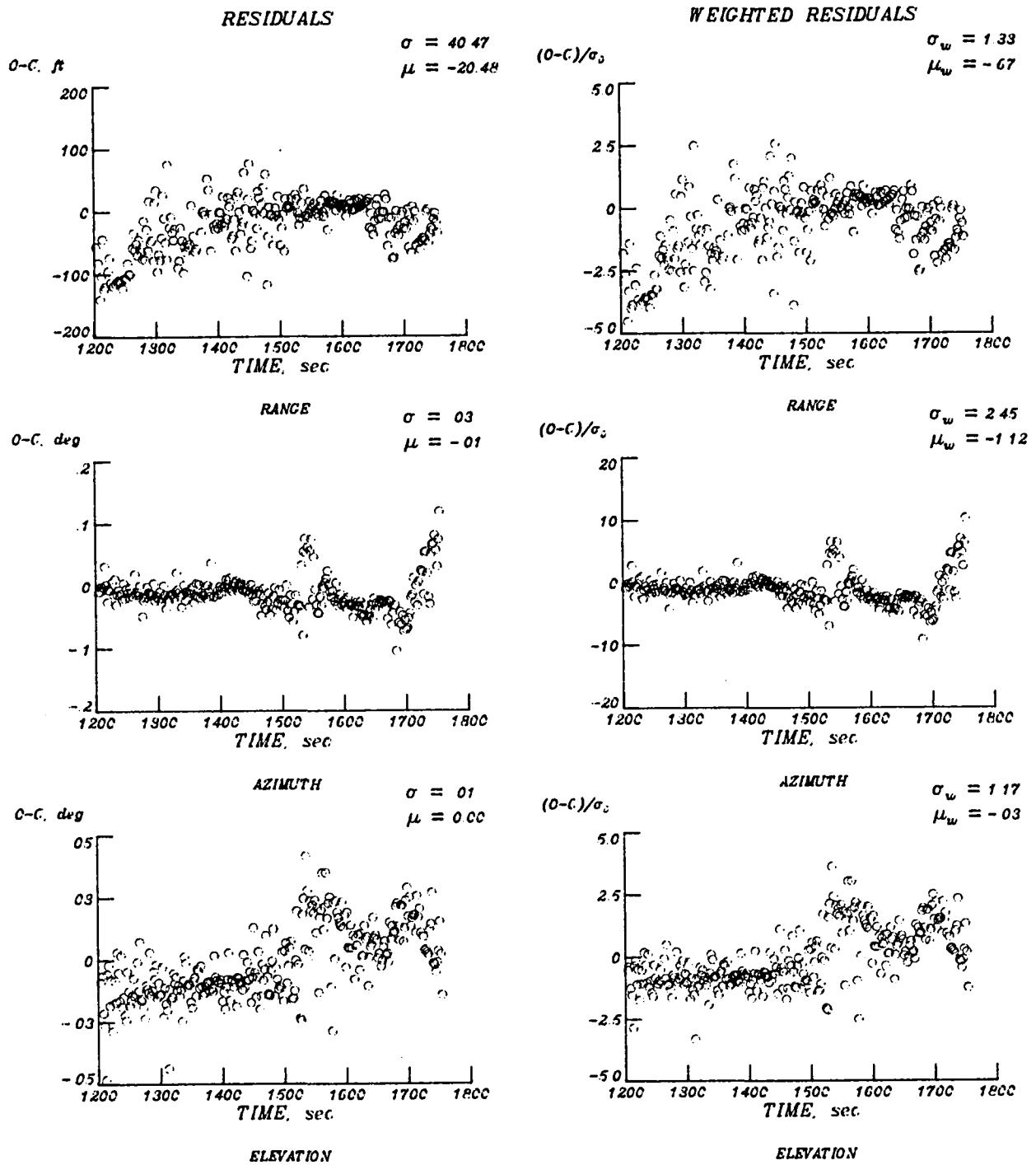


Figure B-6. Smoothed residuals versus time for EAFC.

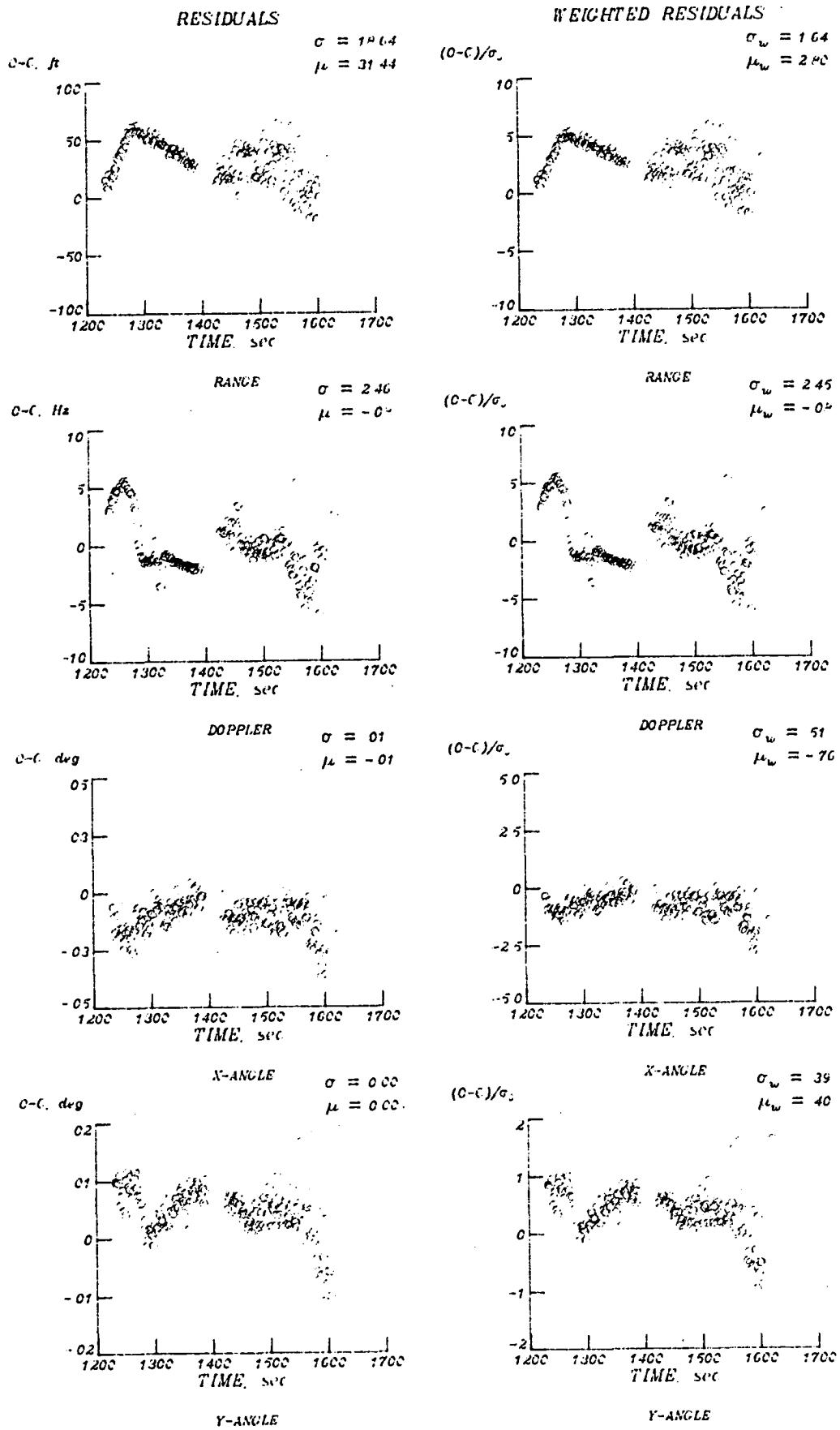


Figure B-7. Smoothed residuals versus time for GDSS.

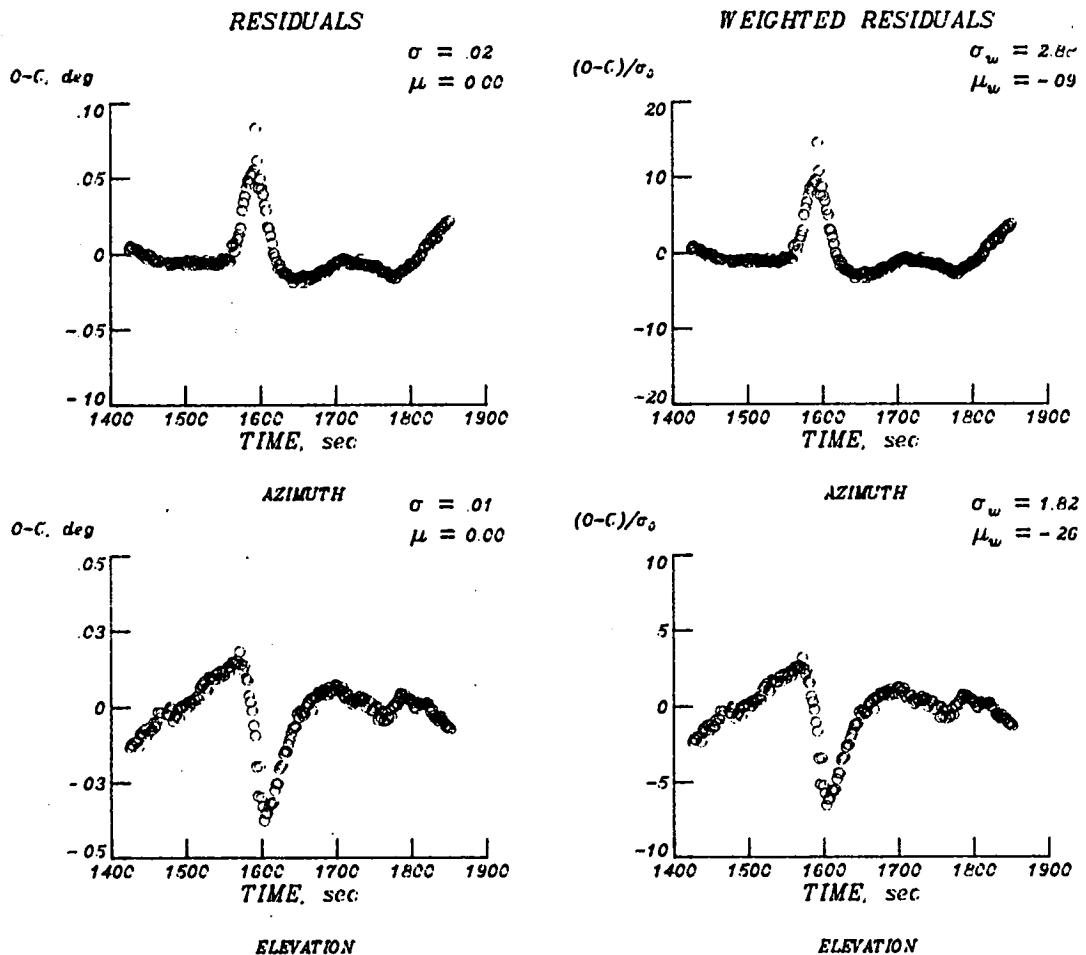


Figure B-8. Smoothed residuals versus time for THE01.

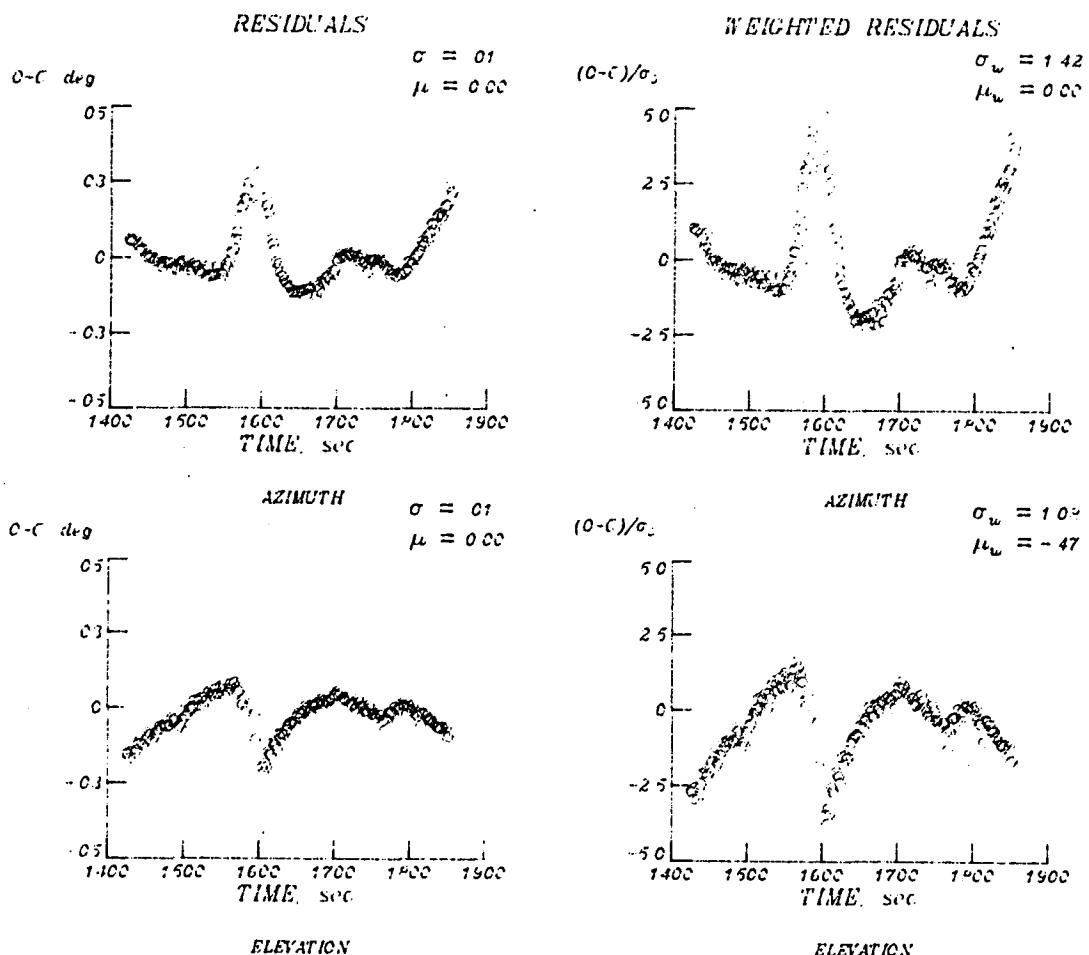


Figure B-9. Smoothed residuals versus time for THE05.

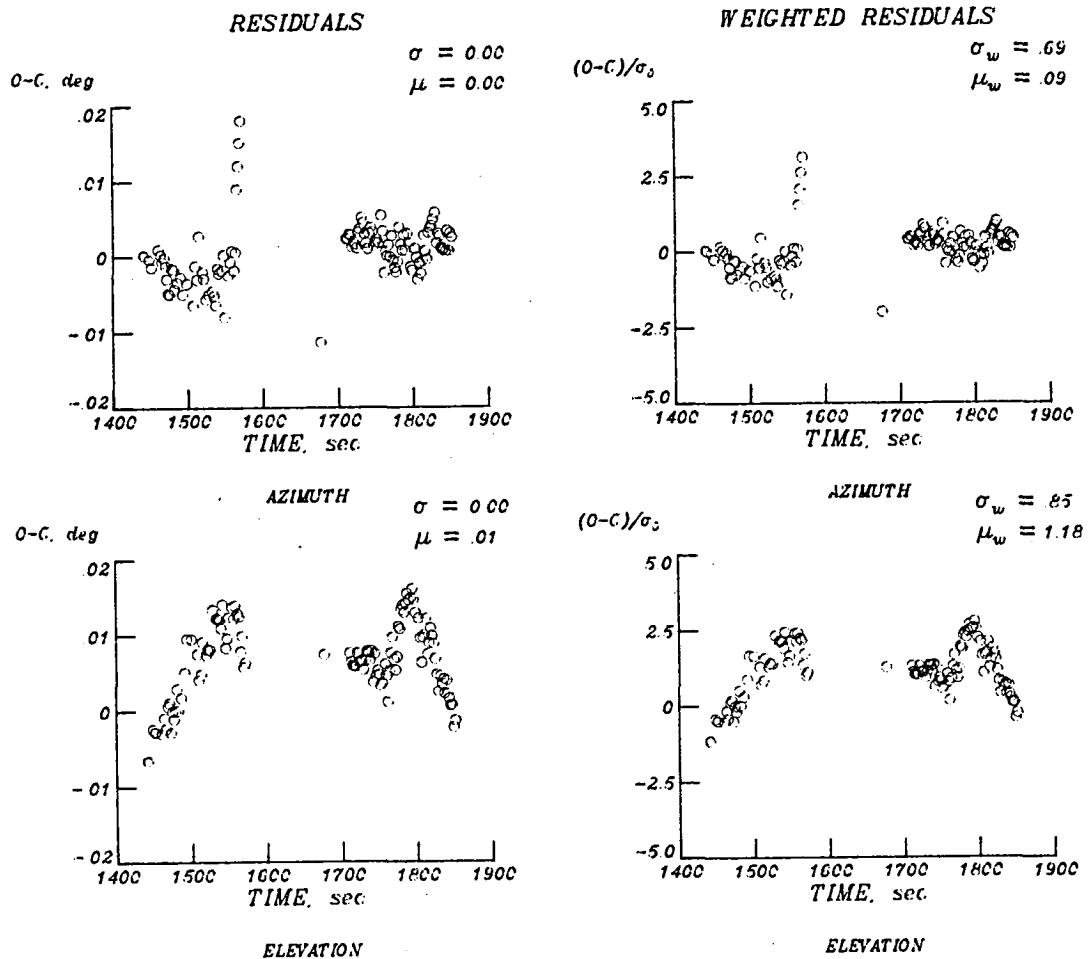


Figure B-10. Smoothed residuals versus time for THE06.

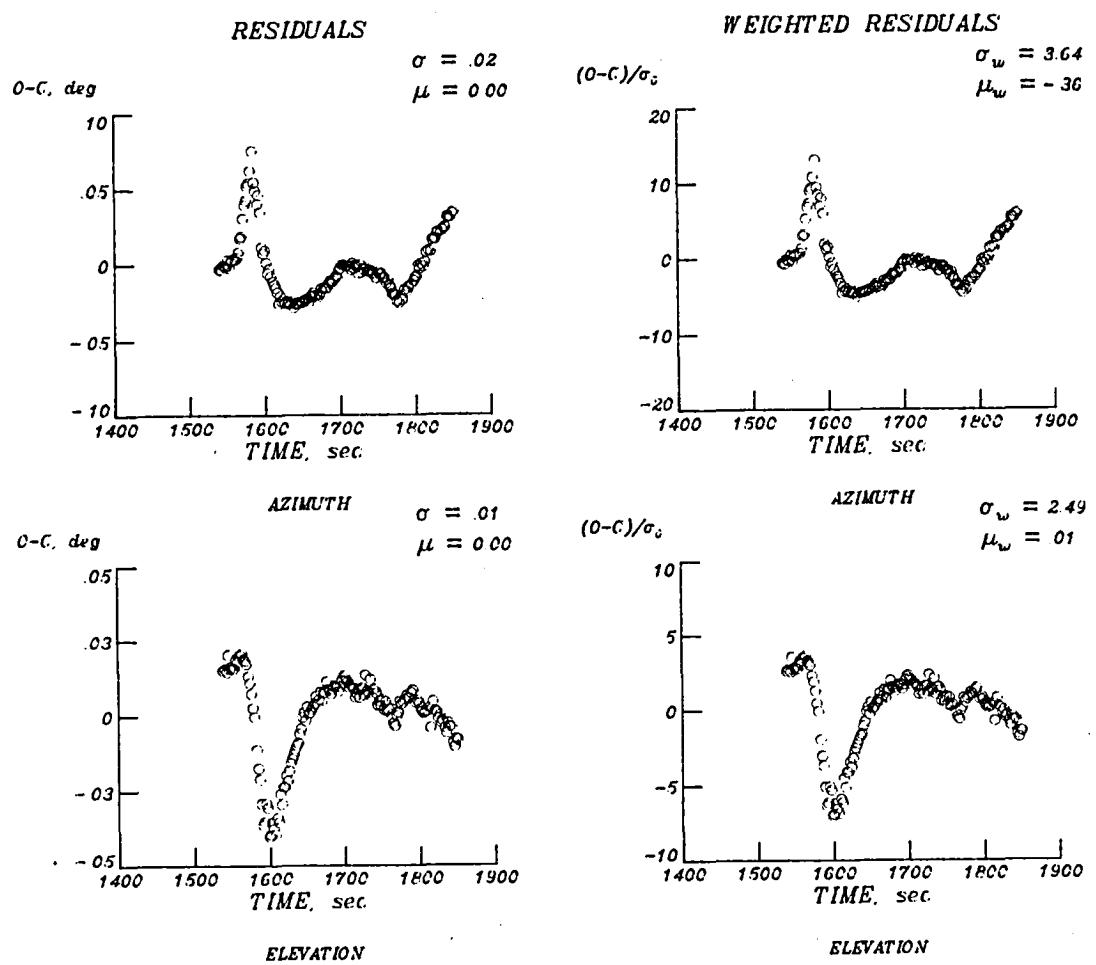


Figure B-11. Smoothed residuals versus time for THE07.

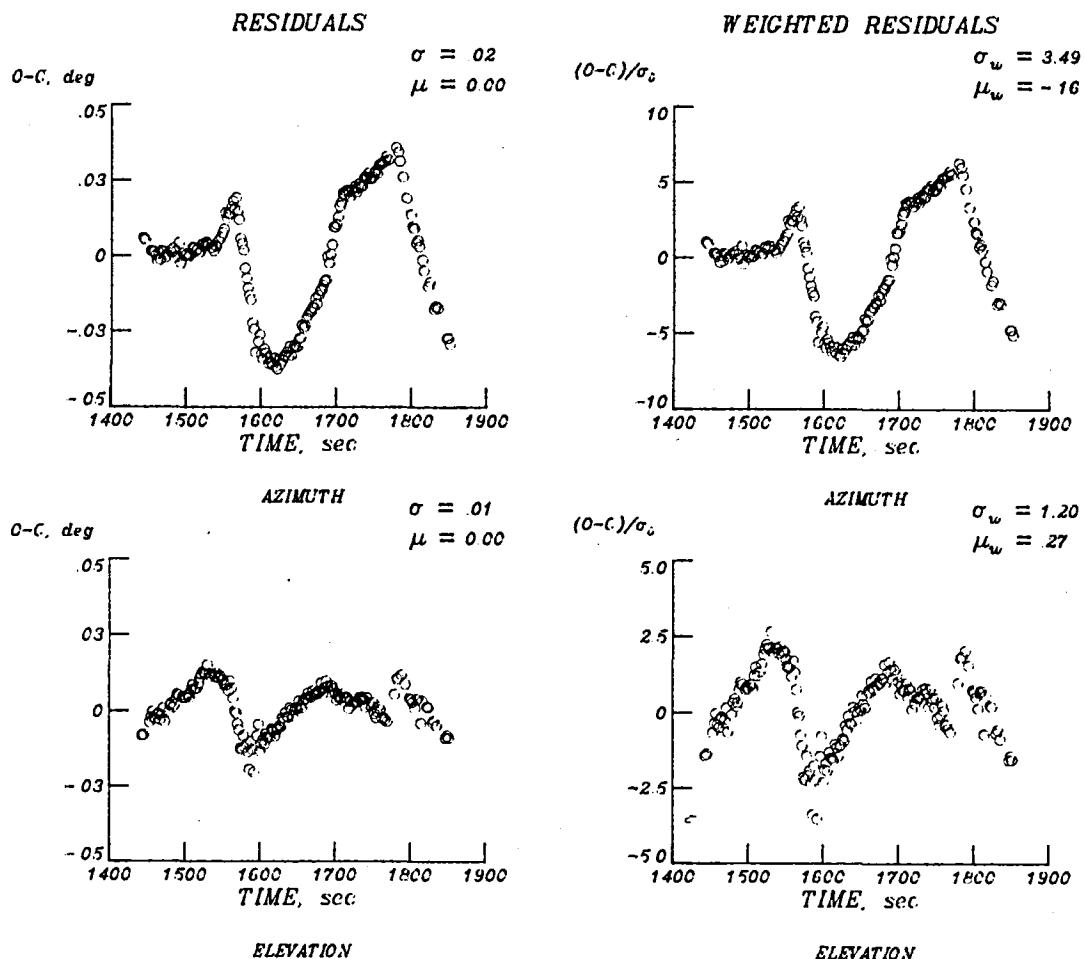


Figure B-12. Smoothed residuals versus time for THE09.

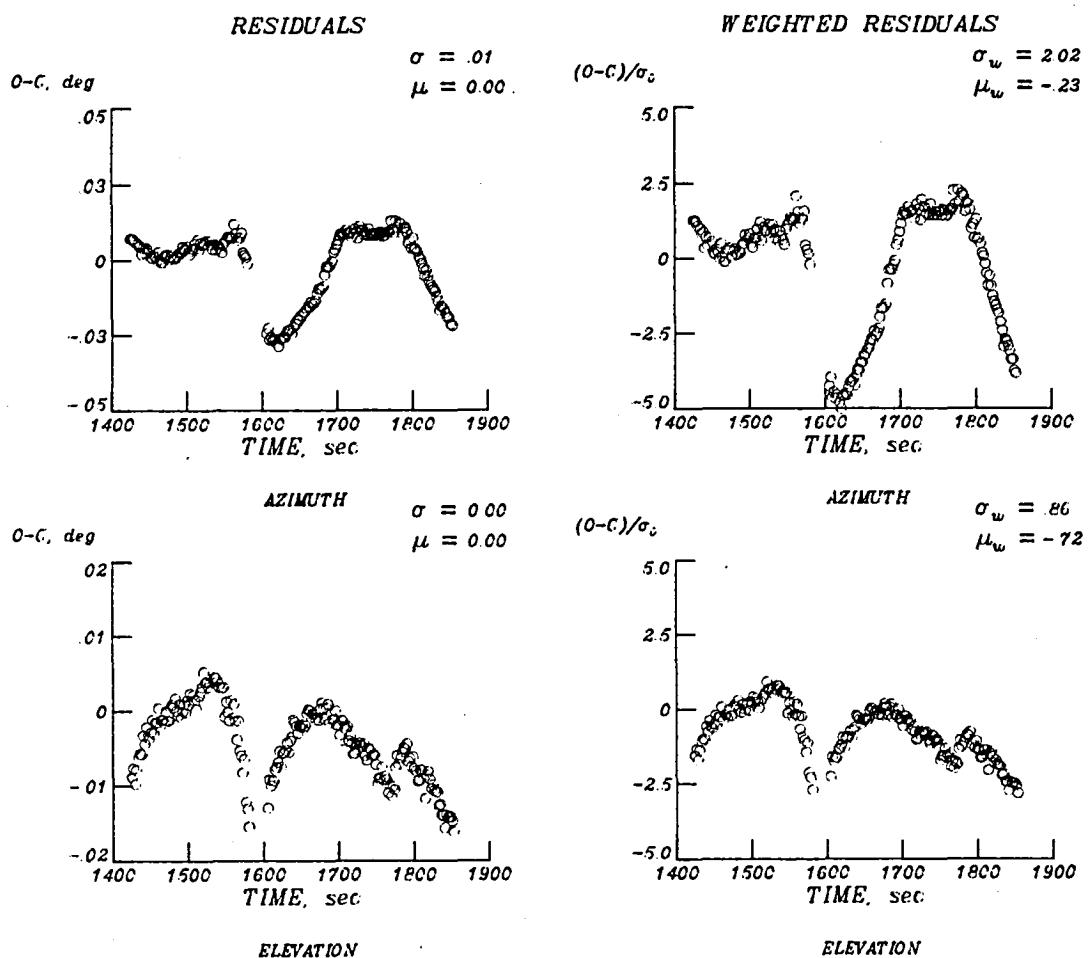


Figure B-13. Smoothed residuals versus time for THE15.

APPENDIX C

Listing of STS9BET air relative parameters
@ 1.0 sec

(t , h , v_A , γ_A , ψ_A , σ_A , β_A , α_A , m_A , q_A)

* LARC "EXTENDED" BET HEADER RECORD *

... DESCRIPTIVE DATA (48-WORDS)

STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.

831208 1881 STS-9 INERTIAL BET /BET9J13/ (TREF=83843)

INITIAL CONDITIONS FROM ARHQTYI (ESOLVE) 1-13-84

IMU NBR 2 EA SEQ 1 (TAPE NX1004)

S,C-BAND, THEODOLITE, NO PSEUDO DATA

SOLUTION SET--STATE, ACCELEROMETER SCALE FACTORS

... LABELS AND UNITS FOR DATA ITEMS

(1)	TIME	SEC	(2)	VEL A	FT/SEC	(3)	GAM A	DEG
(4)	HDG A	DEG	(5)	ALTDE	FEET	(6)	LATD	DEG
(7)	LONG	DEG	(8)	SIGMAA	DEG	(9)	BETA A	DEG
(10)	ALPHAA	DEG	(11)	YAW E	DEG	(12)	PTCH E	DEG
(13)	ROLL F	DEG	(14)	U	FT/SEC	(15)	V	FT/SEC
(16)	W	FT/SEC	(17)	VEL R	FT/SEC	(18)	GAM R	DEG
(19)	HDG R	DEG	(20)	SIGMAR	DEG	(21)	BETA R	DEG
(22)	ALPHAR	DEG	(23)	U-WIND	FT/SEC	(24)	V-WIND	FT/SEC
(25)	W-WIND	FT/SEC	(26)	SIG-VA	FT/SEC	(27)	SIG-GA	DEG
(28)	SIG-HA	DEG	(29)	SIG-H	FEET	(30)	SIG-LA	DEG
(31)	SIG-LN	DEG	(32)	SIG-SA	DFG	(33)	SIG-BA	DEG
(34)	SIG-AA	DEG	(35)	SIG-YE	DEG	(36)	SIG-PE	DEG
(37)	SIG-RE	DFG	(38)	SIG-U	FT/SEC	(39)	SIG-V	FT/SEC
(40)	SIG-W	FT/SEC	(41)	MACH A	NONE	(42)	MACH R	NONE
(43)	PINF	PSF	(44)	TEMP	DEG RANKIN	(45)	RHO	SLUGS/FT3
(46)	Q A	PSF	(47)	Q R	PSF	(48)	PSTAG	PSF
(49)	P	DEG/SEC	(50)	O	DEG/SEC	(51)	R	DEG/SEC
(52)	X ACCEL	FT/SEC/SEC	(53)	Y ACCEL	FT/SEC/SEC	(54)	Z ACCEL	FT/SEC/SEC
(55)	CXR	NONE	(56)	CYR	NONE	(57)	CZB	NONE
(58)	CL	NONE	(59)	CD	NONE	(60)	L/D	NONE
(61)	CL-ROLL	NONE	(62)	CM-PITCH	NONE	(63)	CN-YAW	NONE
(64)	PDOT	DFG/SEC2	(65)	ODOT	DEG/SEC2	(66)	RDOT	DEG/SEC2

... NUMERICAL DATA

ISERNO 1 NWDS 66 IUNITS 2
EPOCH .83843000E+05 RADE

.20925741E+08 RADP .20855591E+08 OMEGA

.72921151E-04

* STS9BET USING AT78, NOAA ATM - INERTIAL-BET9J13, NC0631 DYN. DATA.
***** PAGE 1 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
0.0	356923.6	24950.9	-1.190	60.319	1.736	.538	40.925	22.147	.073
1.0	356445.3	24952.4	-1.189	60.399	1.744	.523	40.915	22.177	.074
2.0	355966.9	24954.0	-1.189	60.480	1.753	.504	40.907	22.206	.076
3.0	355488.5	24955.5	-1.189	60.560	1.757	.486	40.901	22.235	.078
4.0	355010.0	24957.0	-1.189	60.641	1.762	.473	40.887	22.265	.079
5.0	354531.5	24958.5	-1.189	60.722	1.759	.457	40.880	22.295	.081
6.0	354052.9	24960.0	-1.188	60.803	1.754	.441	40.869	22.325	.083
7.0	353574.2	24961.5	-1.188	60.885	1.753	.412	40.849	22.355	.085
8.0	353095.5	24962.9	-1.188	60.966	1.751	.423	40.834	22.385	.087
9.0	352616.7	24964.3	-1.188	61.048	1.747	.450	40.814	22.415	.089
10.0	352137.8	24964.9	-1.188	61.129	1.751	.489	40.796	22.445	.091
11.0	351659.0	24965.6	-1.188	61.210	1.748	.517	40.775	22.475	.093
12.0	351180.3	24966.3	-1.187	61.292	1.750	.546	40.746	22.505	.095
13.0	350701.0	24967.1	-1.187	61.374	1.741	.571	40.726	22.536	.097
14.0	350221.9	24967.7	-1.187	61.455	1.727	.594	40.704	22.566	.099
15.0	349742.8	24968.4	-1.187	61.537	1.692	.603	40.671	22.597	.101
16.0	349263.7	24969.1	-1.187	61.619	1.620	.569	40.647	22.628	.104
17.0	348784.4	24969.8	-1.187	61.701	1.558	.545	40.620	22.659	.106
18.0	348305.2	24970.5	-1.186	61.784	1.494	.522	40.592	22.690	.108
19.0	347825.9	24971.2	-1.186	61.866	1.416	.489	40.565	22.721	.111
20.0	347346.5	24971.9	-1.186	61.949	1.336	.456	40.525	22.753	.113
21.0	346867.1	24972.6	-1.186	62.032	1.251	.426	40.495	22.784	.116
22.0	346387.6	24973.2	-1.186	62.115	1.168	.385	40.459	22.816	.119
23.0	345908.1	24973.6	-1.186	62.198	1.085	.347	40.419	22.848	.121
24.0	345428.6	24973.9	-1.185	62.281	.996	.307	40.376	22.880	.124
25.0	344949.0	24974.2	-1.185	62.365	.910	.271	40.326	22.912	.127
26.0	344469.4	24974.4	-1.185	62.449	.816	.230	40.278	22.944	.130
27.0	343989.7	24974.7	-1.185	62.533	.717	.188	40.230	22.977	.133
28.0	343510.0	24975.0	-1.185	62.617	.621	.143	40.170	23.009	.136
29.0	343030.3	24975.3	-1.184	62.701	.515	.100	40.113	23.042	.140

* STS9BET USING AT78, NOAA ATM - INERTIAL-BET9J13, NC0631 DYN. DATA.
***** PAGE 2 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
30.0	342550.5	24975.6	-1.184	62.785	.412	.052	40.052	23.075	.143
31.0	342070.7	24975.8	-1.184	62.870	.300	-.002	39.990	23.108	.146
32.0	341590.9	24976.1	-1.184	62.954	.192	-.056	39.920	23.142	.150
33.0	341111.0	24976.4	-1.184	63.039	.076	-.104	39.855	23.175	.153
34.0	340631.1	24976.6	-1.183	63.124	-.039	-.156	39.781	23.209	.157
35.0	340151.1	24976.9	-1.183	63.209	-.148	-.215	39.698	23.243	.161
36.0	339671.2	24976.9	-1.183	63.294	-.274	-.270	39.618	23.277	.165
37.0	339191.2	24977.0	-1.183	63.379	-.385	-.320	39.534	23.311	.169
38.0	338711.2	24977.0	-1.183	63.464	-.452	-.332	39.445	23.345	.173
39.0	338231.1	24977.1	-1.182	63.549	-.526	-.340	39.352	23.380	.177
40.0	337751.1	24977.1	-1.182	63.635	-.597	-.349	39.265	23.415	.182
41.0	337270.9	24977.2	-1.182	63.721	-.668	-.363	39.235	23.450	.186
42.0	336790.8	24977.2	-1.182	63.806	-.747	-.374	39.202	23.485	.191
43.0	336310.6	24977.3	-1.182	63.892	-.821	-.386	39.206	23.520	.195
44.0	335830.4	24977.3	-1.181	63.978	-.895	-.400	39.194	23.556	.200
45.0	335350.2	24977.3	-1.181	64.064	-.974	-.413	39.194	23.592	.205
46.0	334869.9	24977.4	-1.181	64.151	-1.064	-.437	39.224	23.628	.210
47.0	334389.6	24977.3	-1.181	64.237	-1.154	-.466	39.280	23.664	.216
48.0	333909.3	24977.3	-1.181	64.324	-1.143	-.396	39.343	23.700	.221
49.0	333429.0	24977.3	-1.180	64.410	-1.068	-.262	39.397	23.737	.227
50.0	332948.7	24977.3	-1.180	64.497	-.983	-.128	39.451	23.773	.233
51.0	332468.4	24977.2	-1.180	64.584	-.901	-.001	39.489	23.810	.238
52.0	331988.1	24977.2	-1.180	64.671	-.819	.133	39.523	23.848	.245
53.0	331507.8	24977.2	-1.179	64.758	-.767	.186	39.547	23.885	.251
54.0	331027.4	24977.2	-1.179	64.846	-.721	.186	39.567	23.923	.257
55.0	330547.1	24977.2	-1.179	64.933	-.675	.180	39.581	23.961	.264
56.0	330066.8	24977.1	-1.178	65.021	-.639	.178	39.585	23.999	.271
57.0	329586.5	24977.1	-1.178	65.109	-.601	.171	39.585	24.037	.278
58.0	329106.2	24977.1	-1.178	65.197	-.572	.171	39.571	24.076	.285
59.0	328625.9	24977.1	-1.178	65.285	-.534	.164	39.591	24.115	.293

* STS9RET USING AT78, NOAA ATM - INERTIAL-BET9J13, NC0631 DYN. DATA.
* PAGE 3 *

TIME (SEC)	ALTDF (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
60.0	328145.6	24976.3	-1.177	65.373	-.498	.160	39.643	24.153	.300
61.0	327665.3	24975.5	-1.177	65.461	-.462	.154	39.686	24.177	.308
62.0	327185.0	24974.5	-1.177	65.550	-.436	.144	39.721	24.199	.316
63.0	326704.7	24973.8	-1.177	65.638	-.407	.144	39.743	24.221	.324
64.0	326224.5	24973.0	-1.176	65.726	-.368	.136	39.760	24.243	.332
65.0	325744.3	24972.1	-1.176	65.815	-.337	.130	39.761	24.265	.340
66.0	325264.1	24971.3	-1.176	65.904	-.305	.121	39.761	24.287	.349
67.0	324783.9	24970.4	-1.175	65.993	-.278	.113	39.749	24.309	.358
68.0	324303.8	24969.6	-1.175	66.082	-.253	.102	39.722	24.332	.367
69.0	323823.7	24968.7	-1.175	66.172	-.225	.091	39.688	24.354	.376
70.0	323343.6	24967.8	-1.174	66.261	-.192	.083	39.648	24.377	.386
71.0	322863.6	24967.0	-1.174	66.351	-.168	.066	39.625	24.400	.395
72.0	322383.6	24965.1	-1.174	66.437	-.145	.047	39.620	24.421	.405
73.0	321903.6	24963.0	-1.173	66.523	-.120	.028	39.617	24.443	.416
74.0	321423.7	24960.8	-1.173	66.609	-.093	.008	39.604	24.465	.426
75.0	320943.9	24958.6	-1.173	66.694	-.073	-.013	39.582	24.487	.437
76.0	320464.1	24956.4	-1.173	66.780	-.046	-.030	39.572	24.508	.449
77.0	319984.3	24956.9	-1.172	66.872	-.012	-.045	39.553	24.533	.460
78.0	319504.6	24954.7	-1.172	66.958	.014	-.064	39.556	24.555	.472
79.0	319025.0	24952.4	-1.171	67.044	.040	-.085	39.555	24.577	.484
80.0	318545.5	24950.1	-1.171	67.131	.072	-.108	39.560	24.599	.497
81.0	318066.0	24947.8	-1.171	67.217	.109	-.118	39.602	24.622	.510
82.0	317586.6	24945.5	-1.170	67.304	.139	-.133	39.632	24.644	.523
83.0	317107.2	24943.2	-1.170	67.390	.170	-.152	39.637	24.667	.537
84.0	316628.0	24940.8	-1.170	67.477	.209	-.172	39.637	24.689	.551
85.0	316148.9	24938.4	-1.169	67.564	.239	-.187	39.618	24.712	.565
86.0	315669.8	24936.0	-1.169	67.651	.277	-.202	39.623	24.735	.580
87.0	315190.8	24933.6	-1.169	67.738	.317	-.214	39.612	24.757	.595
88.0	314711.9	24931.1	-1.168	67.825	.351	-.233	39.597	24.780	.611
89.0	314233.2	24928.7	-1.168	67.913	.399	-.253	39.586	24.803	.627

* STS9BET USING AT78, NOAA ATM - INERTIAL-BET9J13, NC0631 DYN. DATA. PAGE 4 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
90.0	313754.5	24926.2	-1.167	68.000	.436	-.263	39.590	24.826	.644
91.0	313275.9	24923.7	-1.167	68.088	.476	-.278	39.627	24.849	.661
92.0	312797.5	24921.2	-1.166	68.175	.525	-.299	39.638	24.872	.678
93.0	312319.2	24918.6	-1.166	68.263	.566	-.315	39.631	24.896	.696
94.0	311841.0	24916.0	-1.165	68.351	.617	-.322	39.617	24.919	.715
95.0	311353.0	24913.4	-1.165	68.439	.670	-.336	39.612	24.942	.734
96.0	310885.1	24910.8	-1.164	68.527	.718	-.373	39.595	24.966	.754
97.0	310407.4	24907.5	-1.164	68.616	.799	-.278	39.617	24.989	.774
98.0	309929.8	24902.7	-1.164	68.704	.899	-.097	39.653	25.010	.795
99.0	309452.3	24897.9	-1.163	68.793	.992	.075	39.667	25.032	.816
100.0	308975.1	24893.1	-1.163	68.882	1.028	.186	39.672	25.054	.838
101.0	308498.0	24888.3	-1.162	68.972	.923	.178	39.684	25.075	.861
102.0	308021.1	24883.5	-1.162	69.061	.793	.139	39.687	25.097	.884
103.0	307544.3	24878.7	-1.161	69.150	.666	.101	39.675	25.119	.908
104.0	307067.8	24873.9	-1.161	69.240	.529	.066	39.647	25.141	.932
105.0	306591.4	24869.1	-1.160	69.329	.393	.021	39.600	25.163	.957
106.0	306115.3	24864.3	-1.160	69.419	.238	-.030	39.592	25.186	.983
107.0	305639.4	24859.5	-1.159	69.509	.090	-.073	39.602	25.208	1.010
108.0	305163.6	24854.7	-1.158	69.599	-.072	-.128	39.616	25.230	1.038
109.0	304688.1	24849.9	-1.158	69.689	-.232	-.184	39.614	25.253	1.066
110.0	304212.8	24847.0	-1.157	69.779	-.401	-.248	39.604	25.277	1.096
111.0	303737.8	24844.7	-1.156	69.870	-.574	-.314	39.585	25.303	1.126
112.0	303262.9	24842.4	-1.156	69.961	-.758	-.392	39.586	25.328	1.157
113.0	302788.4	24840.1	-1.155	70.052	-.952	-.470	39.637	25.353	1.189
114.0	302314.1	24837.8	-1.154	70.144	-1.120	-.540	39.684	25.379	1.222
115.0	301840.0	24835.5	-1.153	70.236	-1.241	-.559	39.730	25.405	1.256
116.0	301366.2	24833.2	-1.152	70.328	-1.320	-.543	39.774	25.430	1.291
117.0	300892.7	24830.9	-1.152	70.420	-1.417	-.537	39.821	25.456	1.328
118.0	300419.5	24828.7	-1.151	70.513	-1.494	-.542	39.871	25.482	1.365
119.0	299946.5	24826.4	-1.150	70.605	-1.505	-.552	39.921	25.508	1.403

* STS9RET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 5 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
120.0	299473.9	24824.2	-1.149	70.698	-1.482	-.540	39.973	25.534	1.443
121.0	299001.6	24822.0	-1.148	70.792	-1.459	-.525	40.028	25.560	1.483
122.0	298529.6	24819.7	-1.147	70.885	-1.441	-.513	40.085	25.565	1.516
123.0	298057.8	24817.5	-1.146	70.978	-1.426	-.511	40.141	25.569	1.550
124.0	297586.5	24815.3	-1.145	71.072	-1.415	-.511	40.201	25.573	1.585
125.0	297115.4	24813.2	-1.144	71.166	-1.408	-.509	40.262	25.578	1.620
126.0	296644.8	24811.0	-1.143	71.260	-1.409	-.517	40.326	25.582	1.656
127.0	296174.5	24808.8	-1.142	71.355	-1.411	-.526	40.391	25.587	1.693
128.0	295704.5	24806.6	-1.141	71.449	-1.426	-.546	40.460	25.597	1.732
129.0	295234.9	24804.5	-1.140	71.544	-1.439	-.561	40.532	25.607	1.771
130.0	294765.8	24802.3	-1.139	71.639	-1.460	-.583	40.609	25.601	1.809
131.0	294297.0	24800.2	-1.138	71.734	-1.493	-.621	40.695	25.605	1.850
132.0	293828.6	24798.1	-1.136	71.830	-1.519	-.659	40.785	25.610	1.891
133.0	293360.7	24795.9	-1.135	71.926	-1.558	-.699	40.880	25.615	1.933
134.0	292893.2	24793.8	-1.134	72.021	-1.597	-.743	40.988	25.620	1.976
135.0	292426.2	24791.7	-1.133	72.117	-1.633	-.782	41.103	25.624	2.020
136.0	291959.7	24789.8	-1.131	72.215	-1.584	-.743	41.205	25.630	2.065
137.0	291493.6	24787.9	-1.130	72.313	-1.473	-.628	41.291	25.635	2.111
138.0	291028.1	24786.0	-1.128	72.412	-1.365	-.522	41.339	25.640	2.158
139.0	290553.1	24784.1	-1.127	72.510	-1.257	-.425	41.310	25.645	2.207
140.0	290098.6	24782.3	-1.126	72.609	-1.140	-.326	41.271	25.650	2.256
141.0	289634.7	24780.4	-1.124	72.708	-1.050	-.298	41.226	25.656	2.306
142.0	289171.3	24778.6	-1.123	72.807	-.978	-.350	41.176	25.661	2.357
143.0	288708.4	24778.6	-1.121	72.913	-.904	-.377	41.110	25.668	2.410
144.0	288246.2	24779.4	-1.119	73.022	-.837	-.406	41.041	25.677	2.464
145.0	287784.5	24780.2	-1.118	73.131	-.767	-.438	40.959	25.685	2.519
146.0	287323.4	24781.0	-1.116	73.240	-.714	-.482	40.873	25.693	2.576
147.0	286862.9	24781.7	-1.114	73.349	-.661	-.541	40.782	25.701	2.633
148.0	286402.8	24782.5	-1.113	73.458	-.599	-.598	40.690	25.709	2.692
149.0	285943.4	24783.3	-1.111	73.566	-.534	-.640	40.595	25.718	2.752

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.
***** PAGE 6 ****

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
150.0	285484.6	24784.0	-1.109	73.675	-.460	-.689	40.482	25.726	2.814
151.0	285026.5	24784.8	-1.107	73.784	-.375	-.724	40.374	25.734	2.877
152.0	284558.9	24785.5	-1.106	73.893	-.251	-.741	40.258	25.743	2.941
153.0	284112.0	24786.1	-1.104	74.002	-.119	-.744	40.146	25.751	3.006
154.0	283655.7	24786.8	-1.102	74.110	.033	-.745	40.037	25.759	3.073
155.0	283200.2	24787.5	-1.100	74.219	.204	-.735	39.936	25.767	3.142
156.0	282745.2	24788.1	-1.098	74.328	.393	-.689	39.858	25.776	3.212
157.0	282291.0	24788.1	-1.096	74.435	.594	-.614	39.804	25.783	3.283
158.0	281837.4	24787.2	-1.094	74.540	.798	-.524	39.766	25.790	3.355
159.0	281384.5	24786.2	-1.093	74.644	1.000	-.429	39.739	25.797	3.429
160.0	280932.2	24785.3	-1.091	74.748	1.191	-.344	39.718	25.804	3.505
161.0	280480.7	24784.4	-1.089	74.853	1.365	-.281	39.698	25.811	3.582
162.0	280029.9	24783.4	-1.087	74.958	1.514	-.253	39.672	25.818	3.661
163.0	279579.9	24782.5	-1.085	75.062	1.632	-.275	39.635	25.824	3.742
164.0	279130.7	24781.5	-1.082	75.167	1.712	-.360	39.583	25.831	3.824
165.0	278682.4	24780.5	-1.080	75.272	1.747	-.517	39.511	25.838	3.907
166.0	278234.9	24779.5	-1.078	75.377	1.778	-.655	39.455	25.845	3.993
167.0	277788.3	24778.5	-1.076	75.482	1.850	-.694	39.475	25.852	4.080
168.0	277342.6	24777.5	-1.073	75.587	1.940	-.711	39.594	25.859	4.170
169.0	276897.6	24776.5	-1.071	75.692	2.039	-.727	39.810	25.866	4.261
170.0	276453.6	24775.5	-1.069	75.797	2.169	-.727	40.112	25.873	4.353
171.0	276010.3	24774.8	-1.067	75.902	2.325	-.707	41.121	25.880	4.448
172.0	275568.0	24773.7	-1.063	76.006	2.502	-.658	42.063	25.887	4.545
173.0	275127.0	24772.9	-1.060	76.110	2.693	-.587	42.452	25.894	4.644
174.0	274687.3	24771.9	-1.057	76.214	2.877	-.523	42.457	25.901	4.744
175.0	274248.8	24771.0	-1.054	76.318	3.058	-.479	42.336	25.908	4.847
176.0	273811.4	24770.1	-1.051	76.422	3.149	-.255	42.184	25.915	4.951
177.0	273375.1	24769.2	-1.048	76.526	2.703	-.255	42.050	25.922	5.058
178.0	272940.1	24768.2	-1.045	76.631	2.172	-.325	41.866	25.929	5.166
179.0	272506.2	24767.3	-1.042	76.735	1.633	-.400	41.623	25.931	5.275

* . STS9BET USING AT78, NOAA ATM - INERTIAL-BET9J13, NC0631 DYN. DATA. PAGE 7

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
180.0	272073.5	24766.3	-1.039	76.839	1.101	-.473	41.334	25.934	5.387
181.0	271642.1	24765.4	-1.036	76.944	.601	-.652	40.988	25.922	5.494
182.0	271211.8	24764.4	-1.033	77.048	.238	-.710	40.613	25.907	5.601
183.0	270782.8	24763.4	-1.030	77.153	-.082	-.739	40.229	25.889	5.710
184.0	270355.0	24762.5	-1.027	77.257	-.356	-.731	39.867	25.871	5.819
185.0	269928.4	24761.5	-1.024	77.362	-.582	-.705	39.559	25.852	5.929
186.0	269503.0	24760.6	-1.021	77.467	-.783	-.708	39.309	25.833	6.041
187.0	269078.9	24759.6	-1.017	77.572	-.947	-.732	39.154	25.814	6.155
188.0	268656.0	24758.7	-1.014	77.677	-1.060	-.716	39.052	25.796	6.270
189.0	268234.4	24757.8	-1.011	77.782	-1.149	-.742	39.008	25.777	6.387
190.0	267814.0	24756.8	-1.008	77.887	-1.188	-.814	39.029	25.758	6.506
191.0	267395.0	24755.8	-1.004	77.992	-1.163	-.828	39.114	25.740	6.626
192.0	266977.3	24754.8	-1.001	78.097	-1.080	-.802	39.263	25.721	6.748
193.0	266551.0	24753.7	-.997	78.203	-.950	-.748	39.475	25.702	6.872
194.0	266146.1	24752.5	-.994	78.308	-.781	-.676	39.748	25.684	6.997
195.0	265732.7	24751.3	-.990	78.414	-.591	-.600	40.078	25.666	7.124
196.0	265320.8	24749.9	-.986	78.519	-.406	-.524	40.391	25.647	7.252
197.0	264910.5	24748.5	-.982	78.625	-.233	-.463	40.672	25.629	7.382
198.0	264501.9	24747.1	-.978	78.731	-.104	-.436	40.921	25.610	7.513
199.0	264094.9	24745.6	-.974	78.837	-.010	-.451	41.122	25.592	7.647
200.0	263689.7	24744.0	-.969	78.943	.049	-.486	41.244	25.573	7.781
201.0	263286.2	24742.3	-.965	79.049	.082	-.551	41.300	25.555	7.917
202.0	262884.5	24740.7	-.961	79.155	.123	-.613	41.283	25.541	8.058
203.0	262484.5	24739.0	-.956	79.262	.186	-.663	41.191	25.538	8.207
204.0	262086.4	24737.3	-.952	79.368	.277	-.682	41.026	25.505	8.338
205.0	261690.2	24735.6	-.947	79.474	.383	-.694	40.810	25.483	8.478
206.0	261295.8	24733.8	-.942	79.581	.519	-.699	40.551	25.465	8.622
207.0	260903.3	24731.9	-.938	79.688	.674	-.696	40.262	25.447	8.768
208.0	260512.8	24730.2	-.933	79.794	.847	-.665	39.977	25.429	8.915
209.0	260124.2	24728.4	-.928	79.901	1.013	-.569	39.766	25.411	9.063

* STS9BET USING AT78, NOAA ATM - INERTIAL-BET9J13, NC0631 DYN. DATA. PAGE 8 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
210.0	259737.6	24726.6	-.923	80.008	1.151	-.491	39.603	25.394	9.214
211.0	259352.9	24724.7	-.918	80.115	1.231	-.456	39.497	25.376	9.365
212.0	258970.3	24722.8	-.913	80.222	1.270	-.457	39.455	25.359	9.518
213.0	258589.8	24720.9	-.908	80.329	1.259	-.486	39.475	25.342	9.673
214.0	258211.3	24718.9	-.903	80.436	1.210	-.546	39.551	25.324	9.829
215.0	257835.0	24716.9	-.898	80.544	1.154	-.607	39.692	25.307	9.986
216.0	257460.9	24714.8	-.892	80.650	1.112	-.628	39.888	25.290	10.145
217.0	257089.1	24712.5	-.887	80.757	1.078	-.623	40.123	25.273	10.304
218.0	256719.6	24710.3	-.881	80.864	1.063	-.604	40.389	25.256	10.465
219.0	256352.4	24707.9	-.875	80.972	1.059	-.579	40.615	25.239	10.628
220.0	255987.7	24705.4	-.870	81.079	1.044	-.557	40.775	25.222	10.791
221.0	255625.4	24702.7	-.864	81.186	1.030	-.537	40.883	25.205	10.956
222.0	255265.6	24700.0	-.857	81.294	1.007	-.522	40.927	25.187	11.121
223.0	254908.4	24697.2	-.851	81.401	.964	-.508	40.909	25.171	11.288
224.0	254553.7	24694.4	-.845	81.508	.903	-.516	40.830	25.154	11.455
225.0	254201.7	24691.6	-.839	81.616	.823	-.536	40.698	25.137	11.624
226.0	253852.2	24688.8	-.832	81.723	.742	-.548	40.525	25.120	11.793
227.0	253505.5	24685.9	-.826	81.831	.656	-.570	40.345	25.104	11.964
228.0	253161.4	24683.1	-.819	81.938	.570	-.592	40.171	25.087	12.135
229.0	252820.1	24680.2	-.813	82.046	.503	-.597	40.003	25.071	12.308
230.0	252481.5	24677.2	-.806	82.154	.467	-.581	39.868	25.055	12.481
231.0	252145.8	24674.2	-.799	82.262	.448	-.545	39.771	25.038	12.654
232.0	251812.9	24671.3	-.792	82.370	.446	-.521	39.706	25.022	12.829
233.0	251482.9	24668.1	-.785	82.476	.429	-.495	39.693	25.006	13.004
234.0	251155.9	24665.1	-.778	82.584	.427	-.466	39.721	24.990	13.180
235.0	250831.9	24661.8	-.771	82.693	.416	-.446	39.790	24.975	13.355
236.0	250511.1	24658.3	-.762	82.801	.416	-.437	39.894	24.958	13.532
237.0	250193.9	24654.6	-.754	82.909	.394	-.443	40.035	24.943	13.707
238.0	249880.1	24650.9	-.746	83.018	.365	-.462	40.194	24.927	13.883
239.0	249570.0	24647.0	-.737	83.126	.337	-.488	40.357	24.911	14.059

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.
***** PAGE 9 ****

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
240.0	249263.5	24643.1	-.728	83.235	.316	-.518	40.500	24.895	14.235
241.0	248960.8	24639.0	-.719	83.343	.315	-.533	40.624	24.879	14.410
242.0	248661.9	24634.8	-.710	83.450	.344	-.528	40.716	24.863	14.585
243.0	248366.9	24630.6	-.701	83.559	.392	-.518	40.756	24.848	14.759
244.0	248075.7	24626.4	-.691	83.667	.439	-.512	40.748	24.832	14.933
245.0	247788.4	24622.1	-.682	83.776	.492	-.511	40.699	24.817	15.106
246.0	247505.1	24617.9	-.673	83.885	.542	-.516	40.630	24.802	15.280
247.0	247225.8	24613.5	-.663	83.994	.591	-.529	40.542	24.787	15.452
248.0	246950.4	24609.2	-.653	84.102	.639	-.542	40.438	24.773	15.623
249.0	246679.1	24604.9	-.644	84.211	.713	-.551	40.333	24.759	15.795
250.0	246411.9	24600.5	-.634	84.320	.801	-.540	40.229	24.745	15.965
251.0	246148.8	24596.1	-.624	84.429	.907	-.518	40.153	24.731	16.134
252.0	245889.7	24591.7	-.614	84.537	1.015	-.504	40.104	24.718	16.302
253.0	245634.8	24587.2	-.605	84.647	1.124	-.483	40.076	24.704	16.469
254.0	245334.2	24582.7	-.594	84.757	1.172	-.413	40.074	24.691	16.635
255.0	245137.8	24578.1	-.584	84.866	1.138	-.401	40.090	24.677	16.798
256.0	244895.6	24573.5	-.574	84.975	1.062	-.415	40.116	24.664	16.961
257.0	244657.9	24568.8	-.563	85.084	.946	-.452	40.139	24.651	17.122
258.0	244424.6	24563.9	-.553	85.194	.848	-.475	40.167	24.638	17.280
259.0	244195.8	24559.0	-.542	85.303	.749	-.501	40.196	24.625	17.437
260.0	243971.6	24554.0	-.531	85.412	.648	-.496	40.216	24.612	17.591
261.0	243752.2	24549.0	-.519	85.521	.580	-.653	40.240	24.599	17.744
262.0	243537.5	24543.6	-.508	85.632	.937	-1.141	40.267	24.586	17.894
263.0	243327.6	24538.2	-.496	85.744	2.204	-1.550	40.327	24.573	18.041
264.0	243122.6	24532.6	-.485	85.856	4.468	-1.456	40.419	24.561	18.185
265.0	242922.7	24527.0	-.473	85.969	7.268	-1.091	40.514	24.548	18.326
266.0	242727.6	24521.4	-.461	86.082	10.165	-.867	40.611	24.536	18.465
267.0	242537.6	24515.5	-.449	86.197	13.088	-.724	40.689	24.523	18.601
268.0	242352.5	24509.7	-.437	86.311	16.017	-.676	40.725	24.511	18.734
269.0	242172.3	24503.6	-.426	86.428	18.979	-.631	40.725	24.498	18.864

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 10 *

TIME (SEC)	ALTDF (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
270.0	241997.0	24497.7	-.414	86.544	21.976	-.579	40.684	24.486	18.990
271.0	241826.5	24491.6	-.403	86.662	24.965	-.553	40.624	24.474	19.114
272.0	241660.7	24485.6	-.392	86.779	27.952	-.550	40.564	24.463	19.235
273.0	241499.4	24479.5	-.381	86.898	30.950	-.560	40.509	24.451	19.353
274.0	241342.6	24473.3	-.370	87.017	34.000	-.555	40.445	24.439	19.467
275.0	241190.1	24467.1	-.360	87.138	37.103	-.527	40.384	24.428	19.579
276.0	241041.7	24460.9	-.350	87.258	40.242	-.486	40.336	24.416	19.688
277.0	240897.4	24454.5	-.341	87.380	43.430	-.447	40.287	24.405	19.794
278.0	240756.7	24448.1	-.332	87.503	46.573	-.264	40.259	24.394	19.898
279.0	240619.4	24441.7	-.325	87.626	49.236	.112	40.206	24.383	20.000
280.0	240485.2	24435.3	-.317	87.749	51.156	.219	40.114	24.372	20.099
281.0	240354.2	24428.9	-.309	87.873	52.628	.096	40.010	24.361	20.197
282.0	240226.1	24422.5	-.302	87.997	53.952	-.050	39.925	24.350	20.292
283.0	240100.8	24416.2	-.296	88.120	55.245	-.097	39.867	24.339	20.385
284.0	239978.2	24409.8	-.289	88.245	56.490	-.112	39.832	24.329	20.477
285.0	239858.2	24403.4	-.283	88.369	57.638	-.112	39.842	24.318	20.567
286.0	239740.7	24397.1	-.277	88.493	58.770	-.132	39.881	24.308	20.656
287.0	239625.5	24390.6	-.271	88.618	59.927	-.087	39.940	24.297	20.742
288.0	239512.6	24384.1	-.266	88.743	61.005	-.056	40.012	24.287	20.827
289.0	239401.8	24377.5	-.261	88.868	61.996	-.042	40.087	24.277	20.910
290.0	239293.1	24370.8	-.255	88.993	62.919	.008	40.158	24.266	20.992
291.0	239186.3	24364.1	-.251	89.119	63.733	.063	40.218	24.256	21.072
292.0	239081.5	24357.2	-.246	89.245	64.419	.090	40.262	24.246	21.151
293.0	238978.4	24350.5	-.241	89.371	64.972	.089	40.301	24.236	21.228
294.0	238877.2	24343.5	-.237	89.497	65.456	.055	40.318	24.225	21.305
295.0	238777.6	24336.7	-.233	89.623	65.957	.049	40.322	24.215	21.380
296.0	238679.7	24329.8	-.229	89.749	66.454	.065	40.322	24.205	21.454
297.0	238583.4	24322.9	-.225	89.875	66.946	.077	40.318	24.195	21.526
298.0	238488.7	24316.0	-.221	90.001	67.412	.089	40.316	24.185	21.598
299.0	238395.3	24309.1	-.217	90.127	67.829	.079	40.320	24.175	21.669

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.
* PAGE 11 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
300.0	238303.4	24302.1	-.214	90.254	68.233	.068	40.317	24.165	21.738
301.0	238212.8	24295.2	-.210	90.380	68.619	.062	40.318	24.155	21.807
302.0	238123.5	24288.2	-.207	90.506	69.003	.075	40.319	24.145	21.874
303.0	238035.5	24281.3	-.204	90.632	69.405	.114	40.312	24.135	21.941
304.0	237948.6	24274.2	-.201	90.759	69.792	.215	40.315	24.125	22.007
305.0	237862.9	24267.2	-.198	90.886	70.094	.334	40.316	24.116	22.072
306.0	237778.2	24260.2	-.195	91.012	70.299	.404	40.309	24.106	22.137
307.0	237694.5	24253.1	-.192	91.139	70.415	.450	40.305	24.096	22.200
308.0	237611.8	24246.1	-.190	91.265	70.443	.476	40.305	24.086	22.264
309.0	237530.1	24239.0	-.187	91.392	70.401	.502	40.304	24.077	22.326
310.0	237449.4	24232.0	-.184	91.518	70.302	.469	40.301	24.067	22.388
311.0	237369.8	24224.9	-.182	91.644	70.263	.389	40.306	24.057	22.449
312.0	237291.1	24217.6	-.179	91.771	70.280	.352	40.303	24.048	22.508
313.0	237213.4	24210.5	-.176	91.898	70.343	.283	40.301	24.038	22.568
314.0	237136.8	24203.2	-.173	92.024	70.482	.245	40.302	24.029	22.626
315.0	237061.1	24196.0	-.171	92.151	70.653	.264	40.298	24.019	22.683
316.0	236986.3	24188.7	-.168	92.278	70.802	.296	40.294	24.009	22.740
317.0	236912.5	24181.4	-.166	92.404	70.869	.309	40.289	24.000	22.797
318.0	236839.6	24174.1	-.163	92.531	70.912	.250	40.288	23.990	22.853
319.0	236757.6	24166.7	-.161	92.658	71.023	.210	40.291	23.981	22.907
320.0	236696.4	24159.4	-.159	92.784	71.175	.229	40.283	23.971	22.962
321.0	236626.1	24152.1	-.156	92.911	71.287	.222	40.282	23.962	23.016
322.0	236556.5	24144.8	-.154	93.037	71.433	.191	40.283	23.952	23.069
323.0	236487.7	24137.5	-.152	93.164	71.581	.195	40.273	23.943	23.121
324.0	236419.6	24130.1	-.150	93.290	71.726	.214	40.270	23.934	23.174
325.0	236352.2	24122.8	-.148	93.417	71.861	.208	40.261	23.924	23.225
326.0	236285.4	24115.4	-.146	93.543	71.979	.209	40.259	23.915	23.276
327.0	236219.3	24108.0	-.144	93.670	72.098	.147	40.262	23.905	23.327
328.0	236153.9	24100.6	-.143	93.796	72.245	.140	40.258	23.896	23.377
329.0	236089.0	24093.2	-.141	93.923	72.395	.157	40.256	23.887	23.426

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 12 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
330.0	236024.7	24085.8	-.139	94.049	72.514	.169	40.247	23.878	23.476
331.0	235960.9	24078.4	-.138	94.175	72.567	.157	40.244	23.868	23.525
332.0	235897.6	24071.0	-.136	94.301	72.595	.103	40.241	23.859	23.574
333.0	235834.7	24063.6	-.135	94.427	72.675	.037	40.244	23.850	23.622
334.0	235772.3	24056.3	-.134	94.552	72.804	.026	40.236	23.841	23.671
335.0	235710.3	24049.1	-.132	94.678	72.944	.007	40.236	23.832	23.719
336.0	235648.7	24041.7	-.131	94.804	73.090	-.015	40.234	23.823	23.767
337.0	235587.5	24034.3	-.130	94.929	73.242	-.024	40.232	23.814	23.815
338.0	235526.5	24027.0	-.129	95.055	73.396	-.018	40.230	23.805	23.862
339.0	235465.8	24019.6	-.128	95.180	73.540	-.020	40.227	23.796	23.909
340.0	235405.4	24012.1	-.127	95.306	73.654	-.023	40.220	23.786	23.956
341.0	235345.3	24004.6	-.126	95.432	73.755	-.070	40.219	23.777	24.003
342.0	235285.3	23997.2	-.125	95.557	73.884	-.107	40.222	23.768	24.050
343.0	235225.6	23989.7	-.125	95.683	74.034	-.115	40.229	23.759	24.097
344.0	235166.0	23982.2	-.124	95.809	74.201	-.117	40.220	23.750	24.144
345.0	235106.6	23974.6	-.123	95.934	74.340	-.137	40.220	23.741	24.190
346.0	235047.2	23966.9	-.123	96.060	74.482	-.156	40.222	23.732	24.237
347.0	234988.0	23959.3	-.122	96.186	74.626	-.166	40.228	23.723	24.283
348.0	234923.8	23951.8	-.122	96.311	74.801	-.151	40.231	23.713	24.331
349.0	234869.6	23944.2	-.121	96.436	74.965	-.151	40.231	23.704	24.378
350.0	234810.4	23936.5	-.121	96.562	75.139	-.136	40.222	23.695	24.425
351.0	234751.1	23928.7	-.121	96.688	75.302	-.137	40.222	23.686	24.472
352.0	234691.8	23920.9	-.121	96.814	75.471	-.123	40.213	23.676	24.519
353.0	234632.4	23913.1	-.121	96.939	75.635	-.092	40.214	23.667	24.566
354.0	234572.7	23905.4	-.121	97.065	75.679	.020	40.217	23.658	24.614
355.0	234512.8	23897.6	-.122	97.190	75.339	.283	40.230	23.649	24.663
356.0	234452.4	23889.7	-.122	97.316	74.284	.400	40.264	23.639	24.711
357.0	234392.2	23881.8	-.121	97.441	73.028	.073	40.298	23.630	24.760
358.0	234332.3	23873.8	-.120	97.566	72.237	-.265	40.319	23.620	24.808
359.0	234272.7	23865.8	-.118	97.691	71.927	-.287	40.322	23.611	24.856

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 13 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
360.0	234213.6	23857.8	-.117	97.816	71.777	-.464	40.313	23.601	24.904
361.0	234155.2	23849.9	-.114	97.941	72.409	-1.148	40.319	23.592	24.951
362.0	234097.1	23841.8	-.115	98.066	74.456	-.950	40.369	23.583	24.998
363.0	234038.7	23833.7	-.115	98.192	76.172	-.174	40.386	23.573	25.045
364.0	233979.8	23825.6	-.116	98.317	76.875	.134	40.353	23.564	25.093
365.0	233920.5	23817.6	-.117	98.442	77.105	.139	40.319	23.554	25.142
366.0	233860.5	23809.6	-.118	98.567	77.607	.438	40.246	23.545	25.192
367.0	233799.9	23801.6	-.120	98.692	78.711	1.323	40.143	23.535	25.242
368.0	233738.4	23793.8	-.121	98.817	78.652	1.362	40.081	23.526	25.294
369.0	233676.2	23785.8	-.123	98.942	78.133	1.023	40.066	23.516	25.347
370.0	233613.1	23777.8	-.124	99.067	77.643	.710	40.076	23.507	25.400
371.0	233549.4	23769.9	-.126	99.191	77.241	.524	40.100	23.497	25.455
372.0	233484.8	23761.8	-.128	99.316	76.658	.625	40.143	23.488	25.510
373.0	233419.6	23753.6	-.128	99.441	75.674	.484	40.174	23.478	25.566
374.0	233354.0	23745.3	-.129	99.566	74.693	.265	40.207	23.468	25.622
375.0	233288.2	23736.8	-.129	99.691	73.842	.164	40.246	23.458	25.678
376.0	233222.2	23728.3	-.129	99.815	73.001	.085	40.265	23.448	25.734
377.0	233156.2	23720.0	-.128	99.940	72.192	-.029	40.280	23.438	25.791
378.0	233090.3	23711.7	-.128	100.064	71.481	-.177	40.291	23.429	25.849
379.0	233024.6	23703.4	-.127	100.188	71.056	-.338	40.301	23.419	25.906
380.0	232959.1	23695.1	-.126	100.311	70.861	-.349	40.301	23.409	25.963
381.0	232893.8	23686.7	-.125	100.435	70.733	-.354	40.292	23.399	26.020
382.0	232828.6	23678.4	-.125	100.558	70.665	-.396	40.287	23.389	26.077
383.0	232763.7	23669.9	-.124	100.682	70.666	-.422	40.287	23.379	26.134
384.0	232699.0	23661.5	-.123	100.806	70.716	-.413	40.291	23.370	26.191
385.0	232634.4	23653.0	-.122	100.930	70.775	-.425	40.290	23.360	26.248
386.0	232570.0	23644.4	-.121	101.055	70.814	-.480	40.281	23.350	26.305
387.0	232505.8	23635.6	-.121	101.179	70.896	-.521	40.279	23.340	26.361
388.0	232441.8	23627.0	-.120	101.304	71.106	-.493	40.284	23.330	26.417
389.0	232377.8	23618.4	-.120	101.428	71.239	-.380	40.277	23.320	26.474

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.

***** PAGE 14 *****

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
390.0	232313.9	23609.6	-.119	101.552	71.253	-.346	40.255	23.310	26.530
391.0	232250.1	23600.8	-.119	101.676	71.255	-.354	40.238	23.299	26.586
392.0	232186.3	23591.9	-.118	101.801	71.310	-.330	40.235	23.289	26.642
393.0	232122.7	23582.9	-.118	101.926	71.363	-.324	40.227	23.279	26.698
394.0	232059.1	23573.1	-.117	102.052	71.415	-.289	40.206	23.268	26.753
395.0	231995.8	23563.8	-.116	102.177	71.306	-.242	40.192	23.257	26.808
396.0	231932.4	23554.2	-.116	102.303	70.881	-.124	40.142	23.246	26.863
397.0	231869.3	23544.5	-.115	102.429	70.003	.020	40.017	23.235	26.918
398.0	231806.5	23535.2	-.114	102.554	68.829	-.085	39.848	23.225	26.974
399.0	231744.2	23525.6	-.111	102.679	67.854	-.238	39.648	23.214	27.028
400.0	231682.8	23515.9	-.109	102.804	67.213	-.320	39.462	23.203	27.081
401.0	231622.4	23506.0	-.106	102.930	66.819	-.320	39.320	23.192	27.133
402.0	231562.9	23496.3	-.103	103.056	66.456	-.207	39.174	23.181	27.185
403.0	231504.4	23486.5	-.101	103.181	65.832	-.111	39.004	23.171	27.235
404.0	231446.9	23476.9	-.098	103.306	65.048	-.108	38.798	23.160	27.285
405.0	231390.6	23467.4	-.094	103.430	64.245	-.136	38.585	23.150	27.334
406.0	231335.6	23458.0	-.091	103.554	63.501	-.168	38.392	23.139	27.382
407.0	231282.0	23448.7	-.087	103.678	62.909	-.158	38.208	23.129	27.429
408.0	231229.8	23439.5	-.083	103.801	62.395	-.207	38.038	23.119	27.475
409.0	231178.9	23430.6	-.080	103.923	61.954	-.234	37.891	23.109	27.519
410.0	231129.5	23421.6	-.076	104.046	61.626	-.300	37.764	23.100	27.563
411.0	231081.6	23412.8	-.072	104.168	61.463	-.331	37.658	23.090	27.605
412.0	231035.0	23404.2	-.068	104.289	61.374	-.320	37.581	23.081	27.646
413.0	230989.7	23395.5	-.065	104.411	61.312	-.326	37.514	23.072	27.686
414.0	230945.9	23386.8	-.061	104.532	61.294	-.324	37.479	23.063	27.724
415.0	230903.4	23378.0	-.057	104.654	61.327	-.316	37.464	23.054	27.762
416.0	230862.3	23369.3	-.053	104.775	61.385	-.305	37.466	23.045	27.797
417.0	230822.5	23360.4	-.050	104.896	61.473	-.309	37.475	23.036	27.831
418.0	230784.1	23351.5	-.046	105.018	61.644	-.285	37.473	23.027	27.864
419.0	230747.1	23342.7	-.043	105.139	61.884	-.232	37.477	23.018	27.895

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 15 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
420.0	230711.2	23333.7	-.039	105.260	62.128	-.201	37.479	23.009	27.925
421.0	230676.6	23324.8	-.036	105.381	62.397	-.168	37.481	23.000	27.953
422.0	230643.2	23316.1	-.033	105.502	62.693	-.117	37.484	22.991	27.981
423.0	230610.8	23307.2	-.030	105.623	62.920	-.082	37.484	22.982	28.007
424.0	230579.4	23298.3	-.027	105.744	63.153	-.054	37.485	22.973	28.032
425.0	230548.9	23289.6	-.025	105.864	63.380	-.027	37.486	22.965	28.057
426.0	230519.3	23280.7	-.022	105.985	63.601	.000	37.488	22.956	28.080
427.0	230490.6	23271.9	-.020	106.105	63.802	.016	37.493	22.947	28.102
428.0	230462.7	23263.1	-.018	106.226	63.992	.034	37.493	22.939	28.124
429.0	230435.5	23254.4	-.016	106.346	64.177	.085	37.500	22.930	28.145
430.0	230408.9	23245.5	-.014	106.466	64.263	.141	37.508	22.922	28.165
431.0	230382.9	23236.8	-.012	106.585	64.213	.130	37.517	22.913	28.185
432.0	230357.5	23228.0	-.010	106.705	64.137	.129	37.515	22.905	28.204
433.0	230332.8	23219.3	-.008	106.825	64.031	.122	37.516	22.896	28.223
434.0	230308.6	23210.4	-.007	106.944	63.902	.117	37.528	22.888	28.240
435.0	230285.1	23201.7	-.005	107.063	63.740	.109	37.558	22.879	28.258
436.0	230262.2	23192.8	-.003	107.183	63.556	.107	37.611	22.871	28.274
437.0	230239.9	23184.1	-.001	107.301	63.375	.066	37.684	22.862	28.290
438.0	230218.3	23175.4	.001	107.420	63.240	.039	37.771	22.854	28.305
439.0	230197.3	23166.5	.003	107.538	63.130	-.011	37.865	22.846	28.319
440.0	230176.9	23157.7	.005	107.656	63.119	-.084	37.955	22.837	28.333
441.0	230157.2	23148.8	.007	107.774	63.266	-.152	38.047	22.829	28.346
442.0	230138.2	23139.8	.009	107.893	63.511	-.141	38.126	22.820	28.358
443.0	230119.6	23130.9	.010	108.011	63.792	-.123	38.171	22.812	28.369
444.0	230101.6	23122.0	.012	108.128	64.073	-.106	38.198	22.803	28.381
445.0	230083.9	23112.8	.013	108.247	64.363	-.084	38.227	22.795	28.391
446.0	230066.6	23103.9	.014	108.364	64.646	-.071	38.272	22.786	28.401
447.0	230049.6	23094.9	.015	108.482	64.947	-.049	38.301	22.778	28.411
448.0	230032.9	23085.8	.016	108.600	65.215	-.053	38.337	22.769	28.420
449.0	230016.3	23076.8	.017	108.717	65.497	-.049	38.375	22.761	28.430

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.
***** PAGE 16 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
450.0	229999.8	23067.7	.017	108.835	65.764	-.034	38.422	22.752	28.439
451.0	229983.4	23058.6	.018	108.952	66.038	-.027	38.465	22.744	28.449
452.0	229967.0	23049.2	.018	109.070	66.318	-.014	38.499	22.736	28.458
453.0	229950.6	23040.1	.018	109.187	66.570	-.012	38.535	22.727	28.468
454.0	229934.1	23031.0	.018	109.304	66.788	-.026	38.567	22.719	28.478
455.0	229917.4	23022.0	.018	109.421	67.005	-.042	38.592	22.711	28.489
456.0	229900.4	23012.8	.018	109.538	67.221	-.057	38.606	22.703	28.499
457.0	229883.1	23003.8	.017	109.654	67.451	-.055	38.618	22.695	28.511
458.0	229865.4	22994.9	.016	109.770	67.699	-.043	38.650	22.687	28.523
459.0	229847.1	22985.8	.015	109.887	67.963	-.022	38.701	22.678	28.535
460.0	229828.4	22976.7	.014	110.003	68.217	.002	38.783	22.670	28.549
461.0	229809.1	22967.5	.013	110.119	68.459	.019	38.877	22.662	28.562
462.0	229789.2	22958.4	.012	110.235	68.668	.026	38.962	22.654	28.577
463.0	229768.6	22948.8	.011	110.352	68.845	.005	39.048	22.645	28.591
464.0	229747.4	22939.5	.009	110.468	69.030	.003	39.127	22.636	28.607
465.0	229725.6	22930.0	.008	110.585	69.210	.010	39.194	22.628	28.623
466.0	229703.0	22920.4	.006	110.701	69.391	.025	39.224	22.619	28.640
467.0	229679.6	22910.9	.005	110.817	69.564	.038	39.240	22.610	28.659
468.0	229655.3	22901.5	.003	110.933	69.736	.070	39.247	22.602	28.678
469.0	229630.2	22891.8	.001	111.049	69.879	.093	39.247	22.593	28.698
470.0	229604.2	22882.4	-.001	111.164	70.006	.125	39.244	22.585	28.720
471.0	229577.2	22872.8	-.003	111.280	70.101	.144	39.235	22.576	28.742
472.0	229549.1	22863.6	-.006	111.395	70.094	.178	39.236	22.567	28.767
473.0	229519.8	22854.5	-.009	111.509	69.972	.187	39.245	22.559	28.794
474.0	229489.3	22845.4	-.011	111.623	69.809	.197	39.253	22.551	28.822
475.0	229457.5	22836.4	-.014	111.736	69.636	.184	39.297	22.543	28.852
476.0	229424.7	22827.2	-.017	111.850	69.499	.150	39.390	22.534	28.883
477.0	229390.6	22818.2	-.019	111.963	69.372	.139	39.508	22.526	28.917
478.0	229355.4	22808.9	-.022	112.076	69.258	.107	39.637	22.518	28.950
479.0	229318.9	22799.7	-.025	112.189	69.192	.104	39.770	22.509	28.986

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 17 *

TIME (SEC)	ALTDF (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
480.0	229281.3	22790.2	-.027	112.303	69.109	.102	39.896	22.500	29.022
481.0	229242.6	22780.9	-.030	112.416	68.985	.091	40.016	22.492	29.061
482.0	229202.8	22771.1	-.032	112.529	68.836	.074	40.120	22.483	29.099
483.0	229161.8	22761.6	-.035	112.642	68.671	.063	40.209	22.474	29.140
484.0	229119.8	22751.7	-.037	112.755	68.492	.056	40.298	22.465	29.181
485.0	229076.8	22742.0	-.039	112.868	68.298	.031	40.367	22.456	29.224
486.0	229032.8	22732.0	-.041	112.981	68.157	-.015	40.410	22.447	29.268
487.0	228987.9	22721.9	-.043	113.094	68.054	-.041	40.437	22.437	29.312
488.0	228941.9	22712.2	-.046	113.206	67.940	-.071	40.458	22.428	29.359
489.0	228895.0	22702.1	-.048	113.319	67.828	-.104	40.483	22.419	29.407
490.0	228847.1	22692.3	-.050	113.431	67.750	-.124	40.511	22.410	29.456
491.0	228798.2	22682.3	-.052	113.543	67.699	-.130	40.532	22.401	29.507
492.0	228748.3	22672.1	-.054	113.655	67.649	-.135	40.560	22.391	29.558
493.0	228697.4	22662.2	-.057	113.767	67.612	-.140	40.593	22.382	29.611
494.0	228645.5	22652.0	-.059	113.879	67.591	-.164	40.611	22.372	29.665
495.0	228592.7	22642.2	-.061	113.990	67.578	-.181	40.634	22.363	29.721
496.0	228538.7	22632.0	-.064	114.102	67.612	-.176	40.671	22.353	29.778
497.0	228483.8	22621.7	-.066	114.213	67.670	-.166	40.696	22.344	29.836
498.0	228427.7	22611.8	-.068	114.324	67.728	-.174	40.719	22.335	29.897
499.0	228370.6	22601.6	-.071	114.435	67.809	-.176	40.733	22.325	29.958
500.0	228312.2	22591.5	-.074	114.546	67.892	-.180	40.740	22.315	30.021
501.0	228252.6	22581.5	-.077	114.656	67.991	-.186	40.745	22.306	30.086
502.0	228191.8	22571.3	-.080	114.767	68.128	-.195	40.741	22.296	30.153
503.0	228129.7	22561.1	-.083	114.878	68.303	-.176	40.738	22.287	30.221
504.0	228066.2	22551.0	-.086	114.988	68.448	-.102	40.748	22.277	30.291
505.0	228001.4	22541.0	-.089	115.098	68.471	-.069	40.765	22.268	30.364
506.0	227935.1	22530.8	-.092	115.208	68.434	-.077	40.784	22.258	30.438
507.0	227867.5	22520.3	-.096	115.318	68.403	-.081	40.805	22.248	30.513
508.0	227798.4	22509.8	-.099	115.429	68.376	-.061	40.831	22.238	30.591
509.0	227728.0	22499.3	-.102	115.539	68.244	.002	40.849	22.228	30.670

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 18 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
510.0	227656.3	22488.9	-.105	115.649	67.964	.050	40.864	22.218	30.752
511.0	227583.2	22478.1	-.108	115.760	67.622	.108	40.867	22.208	30.834
512.0	227508.9	22467.3	-.111	115.870	67.143	.112	40.846	22.197	30.919
513.0	227433.5	22456.6	-.114	115.980	66.629	.122	40.800	22.187	31.005
514.0	227357.0	22445.7	-.116	116.090	66.106	.138	40.731	22.177	31.093
515.0	227279.6	22434.9	-.118	116.200	65.566	.164	40.668	22.166	31.182
516.0	227201.2	22424.0	-.120	116.310	64.994	.185	40.618	22.156	31.272
517.0	227122.1	22413.1	-.122	116.419	64.396	.214	40.564	22.145	31.364
518.0	227042.2	22402.2	-.123	116.529	63.732	.207	40.518	22.135	31.457
519.0	226961.8	22391.3	-.124	116.637	63.036	.212	40.457	22.124	31.551
520.0	226880.9	22380.3	-.125	116.746	62.294	.190	40.399	22.113	31.646
521.0	226799.8	22369.3	-.125	116.855	61.610	.115	40.336	22.103	31.741
522.0	226718.4	22358.2	-.125	116.963	61.061	.097	40.278	22.092	31.837
523.0	226637.0	22347.5	-.125	117.071	60.536	.112	40.215	22.082	31.934
524.0	226555.5	22336.5	-.125	117.179	59.988	.123	40.133	22.071	32.031
525.0	226474.1	22325.6	-.125	117.286	59.432	.122	40.054	22.060	32.128
526.0	226392.7	22314.6	-.124	117.393	58.965	.082	39.984	22.050	32.226
527.0	226311.6	22303.6	-.123	117.501	58.622	.037	39.917	22.039	32.323
528.0	226230.8	22292.6	-.122	117.608	58.280	.003	39.848	22.028	32.420
529.0	226150.4	22281.6	-.121	117.716	58.008	-.074	39.789	22.018	32.516
530.0	226070.4	22270.6	-.120	117.825	57.885	-.117	39.735	22.007	32.613
531.0	225990.8	22259.7	-.118	117.933	57.834	-.111	39.666	21.996	32.710
532.0	225911.6	22248.7	-.117	118.042	57.816	-.108	39.584	21.986	32.806
533.0	225832.7	22238.0	-.116	118.149	57.807	-.118	39.505	21.975	32.903
534.0	225754.1	22227.4	-.115	118.257	57.871	-.090	39.443	21.965	33.000
535.0	225675.6	22216.9	-.115	118.364	57.974	-.053	39.399	21.955	33.098
536.0	225597.3	22206.4	-.114	118.471	58.090	-.033	39.357	21.945	33.195
537.0	225519.0	22195.8	-.114	118.578	58.220	-.025	39.328	21.934	33.293
538.0	225440.7	22185.2	-.114	118.685	58.390	.006	39.346	21.924	33.391
539.0	225362.5	22174.5	-.113	118.792	58.567	.032	39.399	21.914	33.489

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 19 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
540.0	225284.3	22163.5	-.113	118.899	58.732	.036	39.470	21.903	33.586
541.0	225206.2	22152.7	-.113	119.007	58.898	.041	39.545	21.892	33.684
542.0	225128.1	22141.9	-.113	119.111	59.014	.094	39.590	21.882	33.782
543.0	225049.9	22130.9	-.112	119.219	59.069	.110	39.588	21.871	33.880
544.0	224971.7	22119.9	-.112	119.326	59.123	.136	39.573	21.860	33.978
545.0	224893.4	22108.9	-.112	119.433	59.168	.161	39.568	21.850	34.077
546.0	224815.0	22097.8	-.112	119.540	59.199	.189	39.576	21.839	34.176
547.0	224736.5	22086.8	-.113	119.647	59.186	.207	39.577	21.828	34.276
548.0	224657.9	22075.8	-.113	119.753	59.138	.204	39.569	21.817	34.376
549.0	224579.1	22064.7	-.113	119.860	59.080	.210	39.558	21.806	34.476
550.0	224500.2	22053.6	-.113	119.966	59.000	.222	39.558	21.795	34.577
551.0	224421.1	22042.5	-.113	120.072	58.893	.232	39.558	21.785	34.679
552.0	224342.0	22031.2	-.113	120.179	58.735	.224	39.563	21.774	34.780
553.0	224252.7	22020.0	-.113	120.285	58.530	.209	39.560	21.763	34.882
554.0	224183.4	22009.0	-.113	120.390	58.302	.203	39.561	21.752	34.985
555.0	224103.8	21998.0	-.114	120.496	58.047	.174	39.569	21.741	35.088
556.0	224024.2	21986.9	-.114	120.601	57.872	.148	39.574	21.730	35.192
557.0	223944.5	21975.8	-.114	120.706	57.747	.148	39.577	21.719	35.296
558.0	223854.3	21964.5	-.113	120.811	57.643	.141	39.596	21.708	35.401
559.0	223785.1	21953.2	-.113	120.916	57.541	.116	39.607	21.697	35.505
560.0	223705.5	21941.9	-.112	121.019	57.404	.086	39.618	21.686	35.610
561.0	223626.0	21930.6	-.112	121.123	57.303	.076	39.612	21.675	35.714
562.0	223546.6	21919.0	-.111	121.228	57.172	.053	39.588	21.663	35.818
563.0	223467.3	21907.4	-.111	121.334	57.063	.029	39.539	21.652	35.922
564.0	223388.4	21895.7	-.110	121.439	56.955	.004	39.519	21.640	36.025
565.0	223309.8	21884.1	-.109	121.544	56.893	.001	39.514	21.629	36.128
566.0	223231.3	21872.6	-.108	121.648	56.883	.018	39.464	21.617	36.232
567.0	223152.9	21861.1	-.108	121.752	56.871	.014	39.385	21.606	36.336
568.0	223074.7	21849.7	-.107	121.856	56.883	.012	39.324	21.595	36.440
569.0	222996.5	21838.3	-.107	121.960	56.939	.029	39.290	21.584	36.545

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 20 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
570.0	222918.3	21826.6	-.107	122.062	56.995	.025	39.310	21.572	36.649
571.0	222840.1	21815.0	-.107	122.164	57.059	.027	39.342	21.561	36.754
572.0	222761.8	21803.3	-.107	122.265	57.140	.006	39.370	21.549	36.859
573.0	222683.4	21792.0	-.107	122.366	57.270	.012	39.377	21.538	36.965
574.0	222604.9	21780.2	-.107	122.468	57.435	.042	39.374	21.526	37.071
575.0	222526.2	21768.4	-.107	122.569	57.604	.043	39.373	21.515	37.177
576.0	222447.3	21756.6	-.108	122.671	57.785	.037	39.373	21.503	37.283
577.0	222368.2	21744.6	-.108	122.772	57.984	.030	39.372	21.491	37.390
578.0	222288.9	21732.6	-.109	122.874	58.222	.041	39.376	21.479	37.496
579.0	222209.3	21720.5	-.109	122.976	58.518	.073	39.377	21.467	37.604
580.0	222129.4	21708.3	-.110	123.078	58.711	.140	39.380	21.455	37.712
581.0	222049.1	21696.1	-.111	123.180	58.790	.160	39.385	21.443	37.820
582.0	221968.4	21683.8	-.112	123.282	58.862	.165	39.381	21.431	37.930
583.0	221887.3	21671.5	-.113	123.384	58.832	.215	39.395	21.418	38.040
584.0	221805.9	21659.6	-.113	123.485	58.699	.230	39.386	21.406	38.153
585.0	221724.1	21647.2	-.114	123.587	58.568	.241	39.362	21.394	38.265
586.0	221642.1	21634.7	-.114	123.688	58.415	.247	39.314	21.381	38.377
587.0	221559.8	21622.3	-.115	123.790	58.251	.263	39.268	21.369	38.490
588.0	221477.2	21609.8	-.116	123.891	58.067	.276	39.216	21.357	38.604
589.0	221394.3	21597.4	-.116	123.992	57.840	.289	39.166	21.344	38.719
590.0	221311.2	21585.0	-.117	124.093	57.591	.299	39.124	21.332	38.835
591.0	221227.8	21572.6	-.117	124.194	57.310	.305	39.090	21.319	38.951
592.0	221144.3	21560.3	-.117	124.295	57.013	.326	39.074	21.307	39.068
593.0	221060.5	21548.1	-.118	124.394	56.680	.319	39.096	21.295	39.186
594.0	220976.5	21535.9	-.118	124.494	56.405	.262	39.130	21.282	39.305
595.0	220892.3	21523.6	-.118	124.593	56.228	.256	39.166	21.270	39.424
596.0	220808.1	21511.3	-.119	124.692	56.099	.238	39.212	21.258	39.544
597.0	220723.6	21498.9	-.119	124.791	55.999	.205	39.264	21.245	39.665
598.0	220639.1	21486.5	-.119	124.890	55.969	.212	39.309	21.233	39.785
599.0	220554.5	21473.9	-.119	124.989	55.912	.192	39.350	21.220	39.906

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 21 *

TIME (SEC)	ALTDF (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
600.0	220459.9	21461.8	-.119	125.087	55.858	.178	39.383	21.208	40.028
601.0	220385.2	21449.0	-.119	125.186	55.800	.171	39.392	21.195	40.149
602.0	220300.6	21436.2	-.118	125.285	55.739	.160	39.391	21.182	40.269
603.0	220216.0	21423.4	-.118	125.384	55.695	.151	39.389	21.169	40.390
604.0	220131.4	21410.6	-.118	125.483	55.654	.135	39.392	21.156	40.511
605.0	220046.9	21397.6	-.117	125.582	55.618	.112	39.390	21.143	40.631
606.0	219962.5	21384.6	-.117	125.681	55.617	.098	39.390	21.130	40.752
607.0	219878.2	21371.2	-.116	125.781	55.671	.113	39.391	21.116	40.872
608.0	219794.0	21358.1	-.116	125.880	55.747	.109	39.370	21.103	40.993
609.0	219710.0	21345.1	-.116	125.978	55.830	.107	39.312	21.090	41.114
610.0	219625.9	21332.5	-.116	126.079	55.965	.259	39.242	21.077	41.237
611.0	219541.4	21320.2	-.117	126.180	55.275	.913	39.207	21.065	41.363
612.0	219456.4	21307.8	-.118	126.282	52.558	1.286	39.251	21.052	41.489
613.0	219371.7	21294.6	-.115	126.388	48.011	1.069	39.403	21.039	41.612
614.0	219288.4	21282.0	-.110	126.486	43.090	.757	39.550	21.026	41.735
615.0	219207.5	21269.4	-.102	126.581	38.170	.632	39.625	21.013	41.854
616.0	219129.8	21256.7	-.092	126.673	33.244	.542	39.614	21.000	41.968
617.0	219056.1	21243.8	-.081	126.760	28.337	.511	39.553	20.987	42.074
618.0	218987.1	21231.0	-.067	126.844	23.432	.509	39.498	20.974	42.172
619.0	218923.2	21218.2	-.053	126.925	18.489	.496	39.447	20.962	42.262
620.0	218864.9	21205.4	-.037	127.003	13.555	.501	39.404	20.949	42.342
621.0	218812.4	21192.8	-.021	127.077	8.627	.501	39.377	20.936	42.412
622.0	218766.0	21180.2	-.004	127.148	3.726	.513	39.370	20.924	42.472
623.0	218725.7	21167.5	.013	127.216	-1.175	.503	39.364	20.912	42.522
624.0	218691.5	21154.5	.029	127.278	-6.068	.479	39.372	20.899	42.558
625.0	218663.2	21141.5	.045	127.336	-10.910	.468	39.414	20.887	42.584
626.0	218640.7	21128.9	.061	127.393	-15.725	.453	39.477	20.875	42.602
627.0	218623.7	21115.8	.075	127.445	-20.509	.437	39.548	20.862	42.608
628.0	218611.8	21102.7	.088	127.493	-25.244	.423	39.614	20.850	42.604
629.0	218604.5	21089.6	.100	127.539	-29.978	.388	39.652	20.838	42.593

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 22 *

TIME (SEC)	ALT DE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
630.0	218601.1	21076.4	.110	127.581	-34.675	.363	39.671	20.825	42.574
631.0	218601.1	21063.3	.118	127.621	-39.346	.341	39.679	20.813	42.549
632.0	218603.7	21050.1	.125	127.658	-44.004	.320	39.706	20.801	42.520
633.0	218608.1	21036.9	.129	127.693	-48.701	.262	39.794	20.789	42.487
634.0	218613.5	21023.6	.130	127.725	-53.332	.226	39.895	20.776	42.452
635.0	218619.0	21010.4	.129	127.755	-57.932	.163	39.992	20.764	42.417
636.0	218623.2	20997.1	.124	127.783	-61.926	-.137	40.050	20.752	42.385
637.0	218625.2	20983.8	.117	127.810	-64.527	-.397	40.050	20.740	42.356
638.0	218624.4	20970.6	.109	127.837	-65.880	-.426	40.050	20.727	42.332
639.0	218620.7	20957.4	.101	127.863	-66.804	-.328	40.071	20.715	42.313
640.0	218614.0	20944.2	.093	127.889	-67.616	-.313	40.135	20.703	42.300
641.0	218603.9	20930.9	.083	127.914	-68.241	-.278	40.232	20.690	42.292
642.0	218590.4	20917.5	.074	127.940	-68.734	-.283	40.338	20.677	42.289
643.0	218573.3	20904.7	.064	127.967	-69.039	-.234	40.448	20.665	42.296
644.0	218552.6	20891.4	.054	127.992	-69.282	-.219	40.545	20.652	42.306
645.0	218528.0	20877.9	.043	128.017	-69.434	-.204	40.648	20.640	42.323
646.0	218499.7	20864.5	.033	128.042	-69.513	-.191	40.762	20.627	42.346
647.0	218467.5	20851.5	.022	128.069	-69.533	-.181	40.886	20.614	42.378
648.0	218431.4	20837.8	.012	128.093	-69.470	-.159	40.999	20.601	42.414
649.0	218391.6	20824.6	.001	128.119	-69.333	-.126	41.107	20.588	42.458
650.0	218347.9	20810.7	-.009	128.142	-69.147	-.103	41.207	20.574	42.507
651.0	218300.5	20797.4	-.019	128.169	-68.905	-.080	41.304	20.561	42.564
652.0	218249.3	20783.4	-.029	128.192	-68.655	-.088	41.391	20.547	42.625
653.0	218194.5	20770.0	-.040	128.218	-68.322	-.058	41.473	20.534	42.696
654.0	218136.1	20756.6	-.049	128.244	-67.927	-.018	41.543	20.520	42.772
655.0	218074.2	20742.5	-.059	128.267	-67.577	.036	41.589	20.506	42.852
656.0	218008.9	20729.0	-.069	128.293	-67.265	.057	41.597	20.493	42.940
657.0	217940.1	20715.6	-.078	128.319	-66.915	.083	41.594	20.479	43.036
658.0	217867.9	20701.5	-.087	128.341	-66.549	.123	41.598	20.465	43.135
659.0	217792.5	20688.2	-.096	128.367	-66.183	.152	41.631	20.451	43.242

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.

PAGE 23 *

TIME (SEC)	ALTDF (FT)	VFLA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BFTAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
660.0	217713.8	20674.3	-.105	128.393	-65.833	.166	41.704	20.437	43.356
661.0	217632.0	20661.3	-.114	128.419	-65.489	.199	41.798	20.423	43.476
662.0	217547.1	20646.9	-.122	128.441	-65.136	.226	41.881	20.408	43.597
663.0	217459.3	20633.3	-.130	128.467	-64.786	.272	41.964	20.394	43.726
664.0	217368.6	20619.6	-.138	128.492	-64.470	.307	42.025	20.380	43.861
665.0	217275.1	20605.8	-.146	128.518	-64.216	.311	42.054	20.366	44.001
666.0	217178.9	20592.0	-.154	128.543	-63.994	.307	42.056	20.351	44.147
667.0	217080.0	20578.2	-.161	128.568	-63.777	.312	42.057	20.337	44.297
668.0	216978.4	20563.4	-.169	128.589	-63.599	.321	42.060	20.321	44.449
669.0	216874.2	20549.5	-.176	128.614	-63.400	.315	42.074	20.306	44.610
670.0	216757.4	20535.5	-.183	128.638	-63.146	.287	42.093	20.291	44.776
671.0	216658.1	20521.4	-.190	128.662	-62.857	.259	42.120	20.276	44.946
672.0	216546.4	20507.2	-.197	128.686	-62.447	.245	42.152	20.261	45.121
673.0	216432.4	20492.8	-.204	128.708	-61.975	.229	42.173	20.246	45.300
674.0	216316.2	20478.1	-.210	128.726	-61.433	.199	42.181	20.230	45.482
675.0	216198.0	20463.2	-.216	128.744	-60.724	.193	42.147	20.214	45.668
676.0	216077.8	20447.8	-.221	128.764	-59.934	.224	42.078	20.197	45.856
677.0	215956.0	20433.0	-.225	128.782	-59.127	.266	42.015	20.181	46.050
678.0	215832.7	20418.1	-.229	128.800	-58.309	.309	41.959	20.165	46.248
679.0	215708.1	20403.2	-.233	128.819	-57.487	.350	41.900	20.149	46.449
680.0	215582.4	20388.3	-.236	128.837	-56.771	.406	41.850	20.133	46.652
681.0	215455.8	20373.4	-.239	128.856	-56.163	.397	41.795	20.117	46.858
682.0	215328.5	20358.4	-.241	128.874	-55.586	.412	41.738	20.100	47.066
683.0	215200.5	20343.5	-.243	128.893	-55.060	.451	41.676	20.084	47.276
684.0	215071.9	20328.5	-.244	128.911	-54.665	.472	41.627	20.068	47.487
685.0	214943.0	20313.5	-.245	128.930	-54.298	.497	41.579	20.051	47.700
686.0	214813.7	20298.4	-.246	128.948	-53.992	.513	41.527	20.035	47.915
687.0	214684.1	20283.4	-.247	128.966	-53.740	.516	41.486	20.018	48.131
688.0	214554.3	20268.3	-.248	128.984	-53.520	.524	41.445	20.002	48.348
689.0	214424.3	20253.2	-.249	129.002	-53.354	.542	41.406	19.985	48.566

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 24 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
690.0	214294.2	20238.1	-.249	129.019	-53.218	.572	41.366	19.969	48.784
691.0	214164.0	20222.8	-.250	129.036	-53.165	.570	41.325	19.952	49.004
692.0	214033.7	20207.6	-.250	129.053	-53.209	.549	41.314	19.935	49.223
693.0	213903.5	20192.2	-.250	129.070	-53.280	.527	41.337	19.918	49.443
694.0	213773.2	20176.7	-.251	129.086	-53.367	.482	41.328	19.901	49.664
695.0	213642.3	20161.4	-.251	129.102	-53.438	.477	41.281	19.884	49.886
696.0	213512.1	20146.1	-.252	129.118	-53.452	.451	41.230	19.867	50.109
697.0	213381.3	20130.8	-.253	129.133	-53.414	.426	41.184	19.850	50.334
698.0	213250.2	20115.4	-.254	129.149	-53.356	.437	41.167	19.833	50.559
699.0	213119.0	20100.0	-.255	129.164	-53.340	.435	41.188	19.816	50.785
700.0	212987.6	20084.5	-.255	129.179	-53.379	.422	41.217	19.799	51.012
701.0	212856.0	20068.3	-.256	129.195	-53.441	.413	41.240	19.781	51.237
702.0	212724.3	20052.7	-.257	129.209	-53.508	.420	41.233	19.763	51.466
703.0	212592.3	20036.9	-.258	129.223	-53.628	.397	41.241	19.745	51.695
704.0	212460.3	20021.1	-.258	129.236	-53.802	.369	41.239	19.728	51.924
-122-	212328.0	20005.1	-.259	129.249	-53.952	.322	41.233	19.710	52.155
706.0	212195.5	19989.2	-.260	129.261	-53.962	.275	41.210	19.692	52.386
707.0	212062.7	19973.1	-.261	129.273	-53.898	.253	41.154	19.674	52.618
708.0	211929.8	19957.0	-.262	129.285	-53.825	.237	41.078	19.656	52.852
709.0	211796.7	19940.9	-.262	129.296	-53.760	.214	41.032	19.638	53.087
710.0	211663.4	19924.8	-.263	129.308	-53.631	.183	40.997	19.620	53.323
711.0	211530.1	19908.6	-.264	129.318	-53.434	.199	40.945	19.602	53.560
712.0	211396.7	19892.3	-.264	129.329	-53.241	.198	40.886	19.584	53.796
713.0	211263.4	19875.9	-.264	129.339	-53.043	.192	40.847	19.565	54.033
714.0	211130.2	19859.5	-.263	129.350	-52.832	.187	40.805	19.547	54.270
715.0	210997.3	19843.0	-.263	129.359	-52.642	.174	40.746	19.529	54.507
716.0	210864.6	19826.5	-.263	129.369	-52.432	.155	40.687	19.510	54.745
717.0	210732.2	19810.1	-.262	129.379	-52.223	.133	40.632	19.492	54.984
718.0	210600.0	19793.7	-.262	129.389	-51.995	.111	40.574	19.474	55.223
719.0	210468.2	19777.3	-.261	129.398	-51.736	.101	40.526	19.455	55.461

* STS9BET USING AT78, NOAA ATM - INERTIAL-BET9J13, NC0631 DYN. DATA. *
***** PAGE 25 *

TIME (SEC)	ALTDF (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
720.0	210336.8	19760.8	-.260	129.408	-51.428	.098	40.481	19.437	55.699
721.0	210205.8	19744.3	-.258	129.418	-51.104	.141	40.446	19.419	55.937
722.0	210075.5	19727.8	-.257	129.427	-50.902	.182	40.438	19.400	56.174
723.0	209945.8	19711.2	-.255	129.436	-50.821	.202	40.454	19.382	56.410
724.0	209816.7	19694.4	-.254	129.445	-50.753	.211	40.456	19.363	56.645
725.0	209688.4	19677.6	-.252	129.454	-50.782	.245	40.457	19.344	56.878
726.0	209560.8	19660.6	-.250	129.462	-50.918	.223	40.445	19.326	57.109
727.0	209434.0	19643.6	-.248	129.470	-51.072	.191	40.417	19.307	57.339
728.0	209307.9	19626.5	-.246	129.477	-51.210	.184	40.367	19.288	57.568
729.0	209182.5	19609.2	-.244	129.484	-51.384	.163	40.322	19.269	57.794
730.0	209057.8	19591.8	-.243	129.490	-51.595	.122	40.270	19.250	58.019
731.0	208933.9	19574.4	-.241	129.496	-51.751	.080	40.221	19.231	58.242
732.0	208810.6	19556.8	-.239	129.501	-51.907	.044	40.172	19.211	58.464
733.0	208688.1	19539.3	-.237	129.505	-52.046	.011	40.111	19.192	58.685
734.0	208566.1	19521.9	-.236	129.510	-52.042	-.032	40.051	19.173	58.906
735.0	208444.6	19504.5	-.235	129.515	-51.958	-.027	39.983	19.154	59.126
736.0	208323.7	19487.1	-.234	129.519	-51.856	-.039	39.931	19.135	59.346
737.0	208203.3	19469.6	-.232	129.523	-51.689	-.019	39.894	19.116	59.564
738.0	208083.6	19452.1	-.231	129.527	-51.492	-.010	39.859	19.096	59.781
739.0	207964.5	19434.6	-.229	129.531	-51.292	.017	39.852	19.077	59.997
740.0	207846.1	19417.0	-.227	129.535	-51.200	.021	39.854	19.058	60.212
741.0	207728.5	19399.3	-.225	129.538	-51.136	.027	39.858	19.039	60.425
742.0	207611.8	19381.6	-.223	129.542	-51.120	.054	39.864	19.019	60.636
743.0	207495.8	19363.8	-.221	129.545	-51.091	.063	39.858	19.000	60.845
744.0	207380.7	19345.9	-.219	129.547	-51.071	.111	39.859	18.981	61.051
745.0	207266.4	19328.0	-.216	129.550	-51.204	.136	39.867	18.961	61.256
746.0	207152.9	19310.0	-.214	129.552	-51.438	.120	39.867	18.942	61.459
747.0	207040.2	19291.9	-.212	129.553	-51.672	.106	39.858	18.922	61.660
748.0	206928.2	19273.9	-.211	129.554	-51.903	.100	39.848	18.902	61.859
749.0	206816.8	19255.7	-.209	129.555	-52.146	.089	39.837	18.883	62.058

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 26 *

TIME (SEC)	ALTOF (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
750.0	206705.9	19237.5	-.208	129.555	-52.387	.079	39.829	18.863	62.255
751.0	206595.6	19219.1	-.207	129.555	-52.596	.087	39.821	18.843	62.449
752.0	206485.7	19200.7	-.206	129.554	-52.794	.096	39.816	18.823	62.643
753.0	206376.3	19182.2	-.205	129.553	-52.976	.099	39.810	18.803	62.835
754.0	206267.4	19163.7	-.204	129.551	-53.174	.098	39.790	18.783	63.026
755.0	206158.7	19145.1	-.203	129.549	-53.381	.079	39.769	18.763	63.217
756.0	206050.4	19126.5	-.203	129.546	-53.598	.055	39.738	18.743	63.406
757.0	205942.3	19107.2	-.203	129.544	-53.798	.032	39.713	18.723	63.591
758.0	205834.3	19088.6	-.203	129.541	-53.981	.013	39.694	18.703	63.781
759.0	205726.4	19069.8	-.203	129.537	-54.128	-.005	39.679	18.682	63.969
760.0	205618.6	19051.1	-.203	129.532	-54.256	-.041	39.658	18.662	64.158
761.0	205510.8	19032.2	-.203	129.528	-54.318	-.051	39.655	18.642	64.347
762.0	205402.9	19013.4	-.204	129.523	-54.324	-.066	39.654	18.622	64.536
763.0	205295.0	18994.5	-.204	129.518	-54.260	-.066	39.649	18.601	64.724
764.0	205187.1	18975.6	-.205	129.513	-54.109	-.054	39.643	18.581	64.913
765.0	205079.2	18956.6	-.205	129.507	-53.939	-.010	39.641	18.561	65.102
766.0	204971.4	18937.7	-.205	129.502	-53.864	.050	39.663	18.540	65.291
767.0	204863.6	18918.6	-.205	129.496	-53.856	.063	39.680	18.520	65.480
768.0	204755.9	18899.5	-.205	129.490	-53.891	.062	39.677	18.499	65.669
769.0	204648.3	18880.4	-.205	129.484	-53.927	.091	39.676	18.479	65.857
770.0	204540.7	18861.2	-.206	129.477	-54.021	.113	39.682	18.458	66.045
771.0	204433.1	18842.1	-.206	129.470	-54.141	.118	39.678	18.438	66.234
772.0	204325.4	18822.9	-.207	129.463	-54.241	.131	39.675	18.417	66.423
773.0	204217.6	18803.7	-.208	129.456	-54.350	.187	39.716	18.397	66.612
774.0	204109.6	18784.4	-.208	129.448	-54.620	.174	39.772	18.376	66.801
775.0	204001.4	18765.0	-.210	129.440	-54.895	.160	39.811	18.355	66.990
776.0	203892.9	18745.5	-.211	129.431	-55.166	.155	39.842	18.334	67.180
777.0	203783.9	18725.9	-.213	129.422	-55.440	.161	39.869	18.313	67.372
778.0	203674.5	18706.3	-.215	129.412	-55.717	.160	39.908	18.292	67.564
779.0	203564.5	18686.6	-.217	129.401	-55.992	.158	39.927	18.271	67.757

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NCC631 DYN. DATA. PAGE 27 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
780.0	203453.8	18666.9	-.220	129.391	-56.288	.157	39.964	18.250	67.952
781.0	203342.3	18647.1	-.223	129.379	-56.571	.157	39.989	18.229	68.149
782.0	203230.0	18627.5	-.226	129.368	-56.879	.150	40.019	18.208	68.350
783.0	203116.7	18607.9	-.230	129.357	-57.212	.118	40.047	18.186	68.554
784.0	203002.4	18588.2	-.234	129.345	-57.443	.069	40.066	18.165	68.760
785.0	202886.8	18567.5	-.238	129.333	-57.515	.084	40.077	18.143	68.961
786.0	202770.1	18547.6	-.242	129.320	-57.595	.082	40.103	18.121	69.173
787.0	202652.2	18527.7	-.246	129.307	-57.666	.081	40.131	18.100	69.387
788.0	202533.1	18507.7	-.250	129.293	-57.713	.088	40.144	18.078	69.594
789.0	202412.7	18487.6	-.254	129.279	-57.757	.075	40.143	18.056	69.801
790.0	202291.2	18467.3	-.258	129.264	-57.774	.068	40.146	18.034	70.012
791.0	202168.5	18447.2	-.263	129.249	-57.763	.067	40.161	18.012	70.226
792.0	202044.5	18427.0	-.267	129.234	-57.728	.067	40.177	17.990	70.448
793.0	201919.3	18406.7	-.271	129.219	-57.656	.070	40.194	17.969	70.677
794.0	201792.9	18386.4	-.275	129.203	-57.550	.074	40.210	17.947	70.904
795.0	201665.3	18366.0	-.280	129.188	-57.415	.079	40.220	17.925	71.134
796.0	201536.5	18345.6	-.284	129.172	-57.240	.092	40.223	17.903	71.367
797.0	201406.7	18325.2	-.287	129.156	-57.052	.131	40.229	17.880	71.604
798.0	201275.9	18304.6	-.291	129.139	-56.963	.150	40.253	17.858	71.842
799.0	201144.1	18283.9	-.294	129.122	-56.939	.145	40.274	17.835	72.083
800.0	201011.5	18263.2	-.298	129.105	-56.928	.135	40.292	17.813	72.327
801.0	200877.9	18242.4	-.301	129.087	-56.949	.136	40.315	17.790	72.573
802.0	200743.4	18221.5	-.305	129.069	-56.997	.121	40.317	17.767	72.822
803.0	200607.9	18200.7	-.308	129.051	-57.033	.126	40.321	17.745	73.074
804.0	200471.4	18179.8	-.312	129.032	-57.089	.127	40.324	17.722	73.330
805.0	200333.8	18158.9	-.316	129.013	-57.164	.125	40.343	17.699	73.589
806.0	200195.2	18137.9	-.320	128.994	-57.241	.134	40.363	17.676	73.851
807.0	200055.5	18116.7	-.324	128.974	-57.347	.128	40.389	17.653	74.115
808.0	199914.8	18095.5	-.328	128.953	-57.457	.143	40.422	17.630	74.382
809.0	199773.0	18074.1	-.332	128.932	-57.578	.165	40.450	17.607	74.652

* STS98ET USING AT78, NODA ATM - INERTIAL-BET9J13, NC0631 DYN. DATA. PAGE 28 *

TIME (SFC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
810.0	199630.1	18052.6	-.336	128.911	-57.755	.165	40.470	17.583	74.925
811.0	199486.1	18031.2	-.340	128.889	-57.962	.138	40.483	17.560	75.202
812.0	199340.7	18009.7	-.345	128.866	-58.097	.102	40.491	17.536	75.484
813.0	199194.0	17988.1	-.350	128.843	-58.194	.107	40.500	17.513	75.769
814.0	199045.9	17965.1	-.355	128.821	-58.322	.090	40.516	17.488	76.047
815.0	198896.5	17943.2	-.360	128.797	-58.463	.064	40.535	17.464	76.339
816.0	198745.7	17921.2	-.365	128.772	-58.577	.046	40.544	17.439	76.635
817.0	198593.6	17899.2	-.370	128.746	-58.686	.023	40.549	17.415	76.936
818.0	198440.0	17877.0	-.375	128.720	-58.778	.002	40.564	17.391	77.240
819.0	198285.0	17854.7	-.381	128.694	-58.823	.004	40.573	17.367	77.548
820.0	198128.6	17832.4	-.386	128.667	-58.848	-.010	40.581	17.342	77.861
821.0	197970.7	17809.9	-.391	128.639	-58.820	-.015	40.584	17.317	78.179
822.0	197811.4	17787.5	-.397	128.612	-58.759	-.016	40.592	17.293	78.502
823.0	197650.7	17765.0	-.402	128.584	-58.681	-.042	40.601	17.268	78.829
824.0	197488.6	17742.4	-.407	128.555	-58.522	-.031	40.603	17.243	79.161
825.0	197325.2	17719.8	-.412	128.527	-58.312	-.029	40.601	17.218	79.497
826.0	197160.6	17697.1	-.417	128.498	-58.070	-.028	40.613	17.193	79.837
827.0	196994.8	17674.3	-.421	128.469	-57.795	-.043	40.617	17.168	80.182
828.0	196828.0	17651.5	-.425	128.440	-57.549	-.008	40.620	17.143	80.530
829.0	196660.3	17627.9	-.429	128.408	-57.306	-.008	40.607	17.117	80.875
830.0	196491.7	17604.0	-.432	128.377	-57.038	-.013	40.599	17.091	81.220
831.0	196322.5	17579.7	-.435	128.345	-56.777	.032	40.607	17.064	81.566
832.0	196152.8	17555.2	-.437	128.312	-56.649	.047	40.617	17.037	81.911
833.0	195982.6	17530.6	-.439	128.279	-56.567	.064	40.632	17.010	82.258
834.0	195812.2	17505.9	-.441	128.246	-56.512	.062	40.640	16.983	82.606
835.0	195641.4	17481.2	-.443	128.212	-56.466	.054	40.640	16.956	82.956
836.0	195470.2	17456.5	-.445	128.178	-56.415	.052	40.643	16.929	83.307
837.0	195298.7	17431.7	-.447	128.144	-56.379	.045	40.645	16.902	83.660
838.0	195126.9	17406.8	-.449	128.109	-56.359	.031	40.645	16.875	84.014
839.0	194954.8	17381.8	-.451	128.074	-56.313	.041	40.648	16.848	84.369

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 29 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
840.0	194782.3	17355.7	-.452	128.039	-56.276	.051	40.650	16.820	84.724
841.0	194609.7	17331.3	-.454	128.002	-56.254	.064	40.652	16.793	85.078
842.0	194437.0	17306.0	-.455	127.965	-56.255	.074	40.649	16.765	85.433
843.0	194264.1	17280.6	-.457	127.928	-56.304	.065	40.648	16.737	85.790
844.0	194091.0	17255.2	-.459	127.892	-56.394	.057	40.651	16.710	86.149
845.0	193917.5	17230.0	-.461	127.854	-56.494	.067	40.642	16.682	86.510
846.0	193743.6	17204.6	-.463	127.817	-56.608	.081	40.644	16.654	86.872
847.0	193569.3	17179.1	-.466	127.779	-56.774	.115	40.656	16.626	87.236
848.0	193394.4	17152.5	-.469	127.738	-57.119	.099	40.692	16.598	87.591
849.0	193219.0	17125.6	-.472	127.695	-57.503	.099	40.743	16.569	87.945
850.0	193042.9	17098.5	-.476	127.652	-57.979	.063	40.776	16.539	88.301
851.0	192865.8	17071.2	-.480	127.608	-58.424	.030	40.797	16.510	88.658
852.0	192687.6	17043.8	-.485	127.562	-58.768	.031	40.804	16.480	89.018
853.0	192508.2	17016.3	-.490	127.516	-59.031	-.003	40.810	16.450	89.383
854.0	192327.5	16988.8	-.496	127.470	-59.213	-.018	40.795	16.420	89.753
855.0	192145.3	16951.2	-.503	127.422	-59.385	-.030	40.785	16.390	90.128
856.0	191961.5	16933.7	-.509	127.375	-59.560	-.039	40.788	16.361	90.510
857.0	191776.1	16906.1	-.516	127.327	-59.782	-.075	40.831	16.331	90.897
858.0	191588.9	16878.3	-.523	127.278	-59.981	-.096	40.874	16.300	91.290
859.0	191399.9	16850.0	-.530	127.227	-60.142	-.089	40.912	16.270	91.685
860.0	191209.3	16821.6	-.537	127.176	-60.305	-.118	40.959	16.239	92.084
861.0	191016.9	16792.9	-.545	127.123	-60.370	-.144	40.979	16.208	92.488
862.0	190822.8	16764.1	-.552	127.070	-60.326	-.127	40.976	16.177	92.897
863.0	190626.9	16735.3	-.559	127.017	-60.293	-.140	40.965	16.145	93.313
864.0	190429.4	16706.3	-.566	126.963	-60.253	-.160	40.952	16.114	93.736
865.0	190230.2	16677.2	-.573	126.910	-60.169	-.199	40.947	16.082	94.163
866.0	190029.3	16648.0	-.580	126.857	-59.949	-.223	40.937	16.051	94.596
867.0	189826.9	16618.6	-.586	126.804	-59.616	-.216	40.927	16.019	95.034
868.0	189623.3	16589.1	-.591	126.751	-59.213	-.202	40.922	15.987	95.476
869.0	189418.6	16559.5	-.596	126.697	-58.769	-.165	40.910	15.955	95.922

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 30 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMA4 (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
870.0	189213.0	16529.7	-.600	126.643	-58.349	-.124	40.894	15.922	96.369
871.0	189007.0	16499.7	-.603	126.589	-58.058	-.081	40.886	15.890	96.818
872.0	188800.5	16469.6	-.605	126.534	-57.850	-.083	40.870	15.857	97.267
873.0	188593.7	16439.7	-.608	126.479	-57.641	-.079	40.827	15.825	97.721
874.0	188386.5	16409.9	-.611	126.425	-57.426	-.093	40.779	15.793	98.178
875.0	188179.1	16379.9	-.613	126.370	-57.176	-.086	40.734	15.760	98.635
876.0	187971.6	16349.7	-.614	126.314	-56.953	-.079	40.709	15.727	99.091
877.0	187764.4	16320.3	-.614	126.261	-56.971	-.045	40.720	15.696	99.557
878.0	187557.4	16289.6	-.615	126.203	-57.102	-.091	40.705	15.663	100.006
879.0	187350.6	16258.7	-.616	126.144	-57.220	-.128	40.687	15.629	100.454
880.0	187144.1	16227.6	-.616	126.084	-57.316	-.163	40.659	15.596	100.898
881.0	186937.9	16196.3	-.617	126.023	-57.313	-.183	40.607	15.562	101.340
882.0	186732.1	16164.2	-.617	125.962	-57.204	-.209	40.553	15.528	101.770
883.0	186526.7	16131.8	-.617	125.900	-56.937	-.228	40.494	15.493	102.196
884.0	186321.8	16099.4	-.616	125.840	-56.473	-.255	40.424	15.458	102.620
885.0	186117.7	16067.1	-.615	125.779	-55.909	-.227	40.346	15.424	103.043
886.0	185914.5	16034.9	-.612	125.719	-55.445	-.194	40.276	15.390	103.462
887.0	185712.6	16002.6	-.609	125.659	-55.181	-.173	40.222	15.355	103.877
888.0	185512.1	15970.3	-.606	125.598	-54.968	-.164	40.176	15.321	104.286
889.0	185313.0	15937.9	-.602	125.537	-54.836	-.136	40.156	15.286	104.689
890.0	185115.4	15905.4	-.598	125.475	-54.876	-.134	40.142	15.252	105.083
891.0	184919.4	15872.8	-.594	125.412	-54.940	-.146	40.124	15.217	105.470
892.0	184725.0	15840.1	-.590	125.349	-54.994	-.149	40.112	15.182	105.851
893.0	184532.1	15807.4	-.586	125.286	-55.027	-.128	40.094	15.148	106.224
894.0	184340.6	15774.7	-.583	125.222	-55.078	-.109	40.076	15.113	106.592
895.0	184150.6	15742.0	-.579	125.158	-55.232	-.073	40.066	15.079	106.953
896.0	183961.9	15709.3	-.576	125.093	-55.507	-.076	40.049	15.044	107.309
897.0	183774.3	15676.6	-.574	125.027	-55.843	-.035	40.041	15.010	107.660
898.0	183587.8	15643.9	-.572	124.962	-56.307	-.049	40.043	14.975	108.007
899.0	183402.0	15612.0	-.571	124.903	-56.769	-.030	40.079	14.942	108.360

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.

PAGE 31 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
900.0	183216.9	15579.8	-.571	124.843	-57.223	.013	40.111	14.908	108.708
901.0	183032.1	15547.5	-.572	124.782	-57.757	.028	40.158	14.874	109.051
902.0	182847.5	15515.0	-.573	124.720	-58.323	.037	40.204	14.839	109.391
903.0	182662.8	15482.5	-.576	124.656	-58.965	.019	40.236	14.805	109.730
904.0	182477.6	15449.9	-.580	124.592	-59.483	.001	40.259	14.771	110.071
905.0	182291.5	15417.3	-.585	124.527	-59.976	-.002	40.291	14.737	110.413
906.0	182104.4	15384.5	-.592	124.460	-60.379	-.054	40.330	14.702	110.759
907.0	181915.9	15351.7	-.598	124.393	-60.295	-.047	40.392	14.668	111.107
908.0	181726.1	15318.6	-.604	124.326	-59.909	-.022	40.487	14.633	111.459
909.0	181535.3	15285.4	-.610	124.259	-59.490	.013	40.554	14.598	111.812
910.0	181343.7	15252.1	-.614	124.192	-59.080	-.005	40.594	14.563	112.166
911.0	181151.4	15218.7	-.618	124.125	-58.597	-.003	40.638	14.528	112.521
912.0	180958.8	15185.0	-.620	124.057	-58.057	.016	40.682	14.493	112.871
913.0	180766.3	15151.1	-.621	123.989	-57.487	.043	40.722	14.456	113.206
914.0	180574.0	15117.0	-.621	123.922	-56.890	.020	40.757	14.420	113.538
915.0	180382.5	15082.7	-.620	123.854	-56.083	.031	40.767	14.383	113.862
916.0	180192.2	15048.2	-.616	123.786	-55.225	.048	40.735	14.346	114.177
917.0	180003.6	15013.6	-.611	123.719	-54.303	.009	40.704	14.310	114.484
918.0	179817.1	14979.2	-.603	123.653	-53.175	-.027	40.657	14.272	114.759
919.0	179633.1	14944.8	-.594	123.588	-51.822	-.010	40.592	14.234	115.024
920.0	179452.5	14910.5	-.582	123.526	-50.638	.080	40.548	14.196	115.277
921.0	179275.6	14876.3	-.569	123.465	-49.823	.112	40.487	14.159	115.513
922.0	179102.8	14842.3	-.554	123.404	-49.306	.158	40.441	14.122	115.734
923.0	178934.3	14808.3	-.539	123.344	-49.077	.152	40.389	14.085	115.936
924.0	178770.0	14774.5	-.525	123.283	-48.868	.150	40.344	14.048	116.120
925.0	178610.0	14740.7	-.510	123.223	-48.846	.189	40.319	14.012	116.287
926.0	178454.2	14707.0	-.495	123.162	-48.987	.201	40.300	13.976	116.435
927.0	178302.5	14673.3	-.481	123.100	-49.254	.208	40.297	13.940	116.565
928.0	178154.7	14639.6	-.468	123.037	-49.632	.199	40.280	13.904	116.677
929.0	178010.5	14605.9	-.455	122.973	-49.991	.200	40.269	13.868	116.772

* STS9BET USING AT78, NOAA ATM - INERTIAL-BET9J13, NC0631 DYN. DATA. PAGE 32 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
930.0	177869.9	14572.3	-.443	122.909	-50.615	.257	40.275	13.832	116.852
931.0	177732.4	14538.7	-.434	122.842	-51.876	.184	40.302	13.797	116.917
932.0	177597.2	14505.0	-.428	122.772	-52.801	.021	40.284	13.761	116.970
933.0	177463.8	14471.5	-.422	122.702	-53.075	-.020	40.249	13.726	117.016
934.0	177332.0	14437.9	-.413	122.631	-52.723	.463	40.219	13.691	117.053
935.0	177201.9	14404.5	-.412	122.561	-51.664	1.526	40.178	13.655	117.083
936.0	177073.8	14371.4	-.405	122.490	-51.957	1.422	40.200	13.621	117.110
937.0	176947.6	14338.3	-.399	122.415	-52.955	.633	40.240	13.586	117.126
938.0	176823.1	14305.1	-.395	122.339	-53.314	.340	40.257	13.552	117.132
939.0	176699.9	14272.1	-.391	122.262	-53.543	.223	40.252	13.517	117.133
940.0	176577.7	14238.7	-.389	122.186	-53.723	.150	41.197	13.482	117.123
941.0	176456.9	14202.7	-.383	122.103	-53.863	.144	41.305	13.445	117.064
942.0	176337.5	14168.2	-.380	122.023	-54.048	.106	40.946	13.410	117.020
943.0	176219.3	14133.8	-.377	121.941	-54.258	.076	40.736	13.374	116.972
944.0	176101.9	14099.7	-.375	121.859	-54.386	.014	40.636	13.339	116.924
945.0	175985.3	14065.9	-.375	121.777	-54.447	.022	40.563	13.304	116.875
946.0	175869.0	14032.2	-.374	121.695	-54.222	-.083	40.530	13.269	116.825
947.0	175753.2	13998.5	-.373	121.615	-53.713	.058	40.471	13.235	116.773
948.0	175638.1	13965.0	-.371	121.534	-53.486	.047	40.415	13.200	116.718
949.0	175523.9	13931.6	-.369	121.453	-53.413	.104	40.367	13.166	116.659
950.0	175410.4	13898.2	-.368	121.372	-53.507	.052	40.327	13.131	116.598
951.0	175297.5	13865.0	-.367	121.291	-53.559	.077	40.296	13.097	116.533
952.0	175185.1	13831.7	-.367	121.210	-53.713	.106	40.273	13.063	116.466
953.0	175073.1	13798.5	-.366	121.127	-54.025	.102	40.238	13.029	116.395
954.0	174961.5	13765.5	-.367	121.041	-54.351	.125	40.201	12.995	116.325
955.0	174850.0	13732.0	-.368	120.956	-54.745	.138	40.180	12.961	116.244
956.0	174738.5	13698.7	-.370	120.870	-55.239	.093	40.174	12.927	116.165
957.0	174626.4	13665.3	-.374	120.783	-55.568	.038	40.179	12.893	116.086
958.0	174513.7	13631.8	-.378	120.694	-55.697	.048	40.160	12.858	116.005
959.0	174400.5	13598.1	-.382	120.605	-55.911	.023	40.126	12.824	115.922

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 33 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
960.0	174286.7	13564.4	-.387	120.514	-56.078	.004	40.086	12.789	115.840
961.0	174171.9	13530.8	-.392	120.423	-56.164	-.029	40.050	12.755	115.761
962.0	174056.2	13497.4	-.398	120.333	-56.165	-.053	40.004	12.721	115.689
963.0	173939.4	13464.2	-.405	120.242	-56.121	-.056	39.961	12.687	115.623
964.0	173821.4	13431.0	-.411	120.151	-56.039	-.026	39.929	12.653	115.559
965.0	173702.2	13397.9	-.417	120.060	-55.952	-.002	39.928	12.619	115.502
966.0	173581.9	13365.2	-.424	119.968	-55.901	-.001	39.950	12.585	115.454
967.0	173460.5	13332.0	-.429	119.874	-55.741	.069	39.946	12.551	115.400
968.0	173338.6	13298.3	-.432	119.778	-55.630	.120	39.958	12.517	115.337
969.0	173216.2	13264.4	-.436	119.681	-55.706	.100	39.967	12.482	115.272
970.0	173093.4	13230.5	-.440	119.583	-55.742	-.054	39.951	12.448	115.208
971.0	172969.8	13196.8	-.445	119.486	-55.108	-.104	39.836	12.413	115.147
972.0	172845.8	13163.4	-.447	119.391	-54.171	.008	39.706	12.379	115.091
973.0	172721.8	13130.3	-.448	119.297	-53.495	.076	39.626	12.345	115.039
974.0	172598.1	13097.4	-.449	119.204	-53.140	.114	39.571	12.311	114.986
975.0	172474.6	13064.3	-.448	119.111	-53.003	.118	39.526	12.277	114.929
976.0	172351.7	13031.3	-.448	119.017	-52.979	.140	39.501	12.244	114.868
977.0	172229.2	12998.3	-.448	118.923	-53.181	.111	39.471	12.210	114.806
978.0	172106.8	12965.5	-.449	118.828	-53.463	.080	39.431	12.176	114.743
979.0	171984.4	12932.7	-.452	118.733	-53.767	.069	39.403	12.143	114.683
980.0	171861.8	12900.0	-.455	118.637	-54.131	.055	39.392	12.110	114.620
981.0	171738.7	12867.3	-.460	118.539	-54.554	.032	39.411	12.076	114.557
982.0	171614.8	12834.4	-.465	118.441	-55.010	-.002	39.433	12.043	114.493
983.0	171489.9	12801.6	-.472	118.341	-55.458	-.027	39.441	12.009	114.431
984.0	171363.8	12768.8	-.480	118.240	-55.842	-.045	39.442	11.976	114.376
985.0	171236.0	12736.1	-.490	118.138	-56.177	-.118	39.454	11.943	114.324
986.0	171106.5	12703.2	-.500	118.035	-56.220	-.086	39.463	11.909	114.277
987.0	170975.2	12670.2	-.509	117.932	-56.167	-.031	39.470	11.875	114.236
988.0	170842.1	12637.1	-.519	117.830	-56.172	-.032	39.482	11.842	114.206
989.0	170707.3	12604.1	-.529	117.726	-56.146	-.027	39.491	11.809	114.185

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 34 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
990.0	170570.6	12571.0	-.539	117.622	-56.087	-.016	39.494	11.776	114.166
991.0	170432.2	12538.2	-.550	117.517	-55.987	.007	39.504	11.743	114.160
992.0	170291.9	12505.4	-.560	117.412	-55.918	.002	39.504	11.710	114.160
993.0	170149.9	12472.8	-.570	117.307	-55.878	-.022	39.508	11.678	114.168
994.0	170005.9	12440.1	-.581	117.202	-55.829	-.045	39.510	11.645	114.182
995.0	169860.1	12407.5	-.592	117.097	-55.748	-.034	39.516	11.613	114.227
996.0	169712.3	12374.9	-.603	116.991	-55.616	-.001	39.525	11.582	114.282
997.0	169562.7	12342.3	-.614	116.886	-55.551	.050	39.544	11.551	114.342
998.0	169411.2	12309.7	-.624	116.779	-55.620	.049	39.556	11.520	114.408
999.0	169257.9	12277.0	-.635	116.672	-55.651	.082	39.565	11.488	114.478
1000.0	169102.6	12244.2	-.646	116.564	-55.727	.083	39.587	11.457	114.553
1001.0	168945.5	12211.3	-.658	116.456	-55.813	.100	39.591	11.425	114.634
1002.0	168786.5	12178.3	-.669	116.346	-55.942	.117	39.592	11.393	114.718
1003.0	168625.5	12145.3	-.681	116.235	-56.106	.089	39.604	11.362	114.807
1004.0	168462.5	12112.3	-.693	116.124	-56.189	.079	39.575	11.330	114.904
1005.0	168297.3	12079.2	-.706	116.011	-56.275	.069	39.529	11.298	115.008
1006.0	168129.8	12046.3	-.719	115.898	-56.365	.008	39.515	11.266	115.122
1007.0	167960.2	12013.2	-.733	115.784	-56.335	.019	39.517	11.234	115.241
1008.0	167788.3	11980.0	-.746	115.669	-56.308	.026	39.494	11.202	115.366
1009.0	167614.2	11947.1	-.759	115.554	-56.324	.016	39.448	11.171	115.502
1010.0	167437.7	11914.2	-.774	115.439	-56.327	-.040	39.401	11.139	115.649
1011.0	167258.8	11881.5	-.788	115.324	-56.177	-.045	39.358	11.107	115.807
1012.0	167077.6	11848.9	-.801	115.207	-55.951	-.016	39.311	11.076	115.977
1013.0	166894.3	11816.4	-.814	115.090	-55.704	.004	39.273	11.044	116.154
1014.0	166708.9	11783.8	-.827	114.973	-55.455	.006	39.273	11.013	116.338
1015.0	166521.6	11751.2	-.839	114.855	-55.196	.016	39.277	10.981	116.528
1016.0	166332.5	11718.7	-.850	114.738	-54.885	.049	39.261	10.950	116.726
1017.0	166141.7	11686.1	-.861	114.621	-54.631	.063	39.234	10.919	116.928
1018.0	165949.5	11653.0	-.869	114.501	-54.375	.081	39.191	10.887	117.127
1019.0	165756.4	11619.8	-.877	114.380	-54.192	.067	39.151	10.855	117.336

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 35 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1020.0	165562.4	11586.5	-.885	114.259	-53.962	.008	39.126	10.824	117.549
1021.0	165367.4	11553.5	-.892	114.139	-53.328	-.043	39.021	10.792	117.766
1022.0	165171.9	11520.8	-.897	114.020	-52.449	.054	38.894	10.761	117.991
1023.0	164976.1	11488.3	-.900	113.904	-51.880	.142	38.813	10.730	118.221
1024.0	164780.3	11455.7	-.903	113.786	-51.707	.130	38.765	10.700	118.457
1025.0	164584.7	11423.1	-.905	113.669	-51.631	.095	38.723	10.669	118.692
1026.0	164389.2	11390.7	-.908	113.551	-51.522	.143	38.672	10.639	118.927
1027.0	164193.8	11358.2	-.910	113.433	-51.489	.176	38.619	10.609	119.160
1028.0	163998.6	11325.6	-.913	113.314	-51.551	.187	38.578	10.578	119.387
1029.0	163803.6	11292.5	-.915	113.194	-51.748	.166	38.555	10.547	119.601
1030.0	163608.7	11259.4	-.918	113.073	-52.095	.110	38.542	10.516	119.812
1031.0	163413.6	11226.3	-.923	112.950	-52.440	.072	38.512	10.485	120.022
1032.0	163218.3	11193.1	-.928	112.825	-52.645	.026	38.443	10.454	120.231
1033.0	163022.6	11159.7	-.933	112.699	-52.732	.022	38.344	10.423	120.434
1034.0	162826.7	11126.3	-.937	112.571	-52.825	.057	38.289	10.392	120.636
1035.0	162630.6	11092.9	-.942	112.442	-52.950	.075	38.254	10.361	120.837
1036.0	162434.1	11059.5	-.948	112.313	-52.970	.041	38.192	10.329	121.040
1037.0	162237.1	11026.6	-.954	112.184	-52.823	.026	38.090	10.299	121.251
1038.0	162039.5	10993.8	-.961	112.056	-52.694	.015	37.995	10.268	121.469
1039.0	161841.3	10961.2	-.968	111.928	-52.547	.040	37.909	10.237	121.690
1040.0	161642.4	10928.7	-.974	111.801	-52.532	.150	37.905	10.207	121.915
1041.0	161443.1	10896.0	-.980	111.671	-52.768	.161	37.911	10.177	122.136
1042.0	161243.1	10863.2	-.987	111.540	-53.016	.218	37.877	10.146	122.354
1043.0	161042.5	10830.3	-.995	111.407	-53.411	.204	37.838	10.115	122.572
1044.0	160841.1	10797.3	-1.004	111.272	-53.837	.131	37.805	10.085	122.800
1045.0	160638.5	10765.9	-1.014	111.146	-54.008	.123	37.795	10.056	123.067
1046.0	160434.7	10734.8	-1.023	111.023	-54.092	.150	37.745	10.027	123.347
1047.0	160229.7	10703.9	-1.034	110.900	-54.243	.134	37.673	9.999	123.636
1048.0	160023.3	10673.1	-1.046	110.775	-54.381	.142	37.618	9.970	123.931
1049.0	159815.2	10642.3	-1.059	110.650	-54.505	.107	37.583	9.943	124.254

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.

* PAGE 36 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HOGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1050.0	159605.4	10611.7	-1.072	110.525	-54.572	.158	37.549	9.915	124.589
1051.0	159393.9	10581.1	-1.086	110.400	-54.772	.129	37.544	9.888	124.932
1052.0	159180.2	10550.5	-1.102	110.272	-54.641	-.157	37.551	9.861	125.284
1053.0	158964.3	10519.9	-1.117	110.145	-52.739	-.407	37.556	9.833	125.645
1054.0	158747.2	10488.9	-1.121	110.024	-48.782	-.207	37.586	9.806	126.005
1055.0	158531.3	10457.8	-1.111	109.913	-43.998	.045	37.599	9.778	126.352
1056.0	158319.3	10426.5	-1.087	109.815	-39.190	.102	37.573	9.750	126.676
1057.0	158113.3	10395.1	-1.052	109.730	-34.366	.159	37.492	9.722	126.963
1058.0	157915.5	10363.6	-1.006	109.658	-29.571	.173	37.413	9.693	127.208
1059.0	157727.4	10332.2	-.951	109.602	-24.762	.191	37.339	9.665	127.402
1060.0	157550.3	10300.8	-.890	109.562	-19.912	.244	37.240	9.637	127.539
1061.0	157385.5	10269.2	-.823	109.533	-15.126	.256	37.127	9.608	127.605
1062.0	157233.5	10237.3	-.751	109.513	-10.263	.285	37.024	9.579	127.595
1063.0	157095.1	10205.5	-.677	109.512	-5.456	.318	36.933	9.550	127.515
1064.0	156970.5	10173.7	-.601	109.529	-.634	.292	36.798	9.521	127.365
1065.0	156859.6	10141.7	-.526	109.565	4.175	.262	36.694	9.492	127.139
1066.0	156762.1	10110.2	-.453	109.618	9.052	.236	36.639	9.463	126.853
1067.0	155677.5	10078.6	-.383	109.691	14.002	.266	36.575	9.434	126.500
1068.0	156605.1	10047.0	-.318	109.782	18.801	.235	36.537	9.404	126.081
1069.0	156543.8	10015.4	-.258	109.890	23.600	.188	36.528	9.375	125.605
1070.0	156492.4	9983.8	-.206	110.016	28.470	.171	36.494	9.346	125.079
1071.0	156449.3	9952.2	-.165	110.157	33.280	.134	36.405	9.316	124.513
1072.0	156412.4	9921.0	-.135	110.314	38.107	.070	36.264	9.287	123.927
1073.0	156379.7	9890.2	-.117	110.484	42.976	.017	36.176	9.259	123.329
1074.0	156348.8	9859.5	-.114	110.667	47.933	.005	36.155	9.230	122.726
1075.0	156317.2	9829.0	-.125	110.863	52.911	-.022	36.160	9.202	122.131
1076.0	156282.4	9798.5	-.152	111.071	57.822	-.073	36.150	9.173	121.553
1077.0	156241.5	9768.2	-.196	111.201	62.254	.041	36.143	9.145	121.008
1078.0	156191.7	9738.0	-.255	111.516	65.235	.201	36.104	9.117	120.512
1079.0	156131.4	9708.2	-.321	111.743	66.712	.131	36.060	9.089	120.074

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 37 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1080.0	156059.7	9678.9	-.390	111.971	67.604	.033	36.028	9.062	119.701
1081.0	155976.0	9649.6	-.463	112.199	68.367	-.007	36.049	9.035	119.383
1082.0	155880.0	9620.3	-.539	112.429	68.994	.001	36.092	9.008	119.113
1083.0	155771.3	9591.0	-.617	112.659	69.373	-.001	36.133	8.980	118.902
1084.0	155649.7	9561.8	-.696	112.892	69.603	.005	36.172	8.953	118.748
1085.0	155515.1	9532.9	-.775	113.125	69.643	-.005	36.199	8.926	118.662
1086.0	155367.6	9503.4	-.855	113.361	69.452	.034	36.232	8.898	118.618
1087.0	155207.3	9474.0	-.934	113.597	68.878	.098	36.247	8.873	118.684
1088.0	155034.6	9444.6	-1.010	113.833	67.556	.200	36.246	8.848	118.820
1089.0	154850.3	9415.4	-1.079	114.066	65.598	.081	36.189	8.821	118.977
1090.0	154655.6	9386.2	-1.142	114.296	63.663	.063	36.135	8.795	119.176
1091.0	154451.7	9357.2	-1.197	114.523	61.657	.082	36.093	8.769	119.422
1092.0	154239.9	9328.3	-1.246	114.745	59.609	.082	36.052	8.743	119.707
1093.0	154021.1	9299.0	-1.289	114.966	57.504	.050	36.012	8.716	120.016
1094.0	153796.7	9269.7	-1.324	115.183	55.606	-.013	35.970	8.690	120.347
1095.0	153567.8	9240.3	-1.353	115.398	54.117	-.051	35.896	8.664	120.696
1096.0	153335.1	9210.8	-1.378	115.611	52.930	-.013	35.798	8.637	121.064
1097.0	153099.1	9181.6	-1.401	115.821	51.753	.043	35.721	8.611	121.451
1098.0	152860.6	9152.4	-1.419	116.028	50.480	.051	35.642	8.585	121.856
1099.0	152620.1	9123.5	-1.434	116.232	49.153	.036	35.562	8.559	122.280
1100.0	152378.2	9094.5	-1.444	116.433	47.901	-.059	35.485	8.533	122.709
1101.0	152135.7	9065.5	-1.451	116.632	47.016	-.072	35.395	8.508	123.139
1102.0	151892.9	9036.5	-1.457	116.830	46.238	.020	35.295	8.483	123.595
1103.0	151650.1	9007.7	-1.459	117.025	45.445	.080	35.193	8.459	124.080
1104.0	151408.0	8978.8	-1.458	117.219	44.982	-.304	35.102	8.434	124.562
1105.0	151166.7	8950.0	-1.459	117.414	46.136	-.166	35.019	8.410	125.041
1106.0	150925.4	8921.3	-1.465	117.615	46.873	-.057	34.891	8.387	125.522
1107.0	150683.8	8891.5	-1.474	117.798	48.658	1.029	34.700	8.362	125.975
1108.0	150440.9	8862.0	-1.489	117.985	48.816	1.137	34.567	8.337	126.442
1109.0	150196.7	8832.5	-1.500	118.169	47.482	.217	34.506	8.312	126.917

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.

PAGE 38 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1110.0	149951.8	8803.0	-1.508	118.353	47.242	.017	34.415	8.287	127.396
1111.0	149706.2	8773.6	-1.518	118.536	47.329	.036	34.289	8.263	127.881
1112.0	149459.9	8744.3	-1.527	118.720	47.380	.017	34.442	8.238	128.372
1113.0	149213.1	8713.7	-1.533	118.909	47.397	-.019	35.008	8.212	128.827
1114.0	148966.6	8682.3	-1.536	119.102	47.551	-.013	34.684	8.186	129.258
1115.0	148720.1	8652.0	-1.543	119.294	47.794	.018	34.266	8.160	129.719
1116.0	148473.3	8621.9	-1.550	119.486	48.111	.053	33.949	8.135	130.191
1117.0	148225.9	8592.2	-1.562	119.681	48.412	.210	33.752	8.110	130.674
1118.0	147977.3	8562.7	-1.575	119.878	47.562	.671	33.585	8.085	131.171
1119.0	147727.9	8533.3	-1.580	120.067	44.138	.669	33.432	8.061	131.676
1120.0	147479.7	8505.5	-1.568	120.247	39.541	.124	33.303	8.038	132.254
1121.0	147234.9	8481.6	-1.546	120.417	37.028	-.231	33.058	8.018	132.874
1122.0	146994.1	8457.1	-1.523	120.584	36.695	-.070	32.810	7.997	133.482
1123.0	146757.3	8432.6	-1.501	120.751	36.739	.041	32.665	7.977	134.074
1124.0	146524.4	8408.3	-1.479	120.918	37.111	-.092	32.582	7.957	134.648
1125.0	146295.1	8384.0	-1.460	121.089	38.250	-.099	32.506	7.937	135.201
1126.0	146068.9	8359.6	-1.445	121.265	39.638	-.050	32.413	7.916	135.738
1127.0	145845.2	8335.4	-1.433	121.446	40.887	-.019	32.331	7.896	136.262
1128.0	145623.4	8311.1	-1.426	121.632	41.874	-.067	32.193	7.876	136.778
1129.0	145403.1	8287.0	-1.421	121.821	42.808	-.087	32.035	7.855	137.287
1130.0	145183.9	8262.8	-1.419	122.014	43.730	-.042	31.937	7.835	137.792
1131.0	144965.3	8238.8	-1.420	122.210	44.443	-.020	31.872	7.815	138.295
1132.0	144747.0	8214.6	-1.422	122.410	44.978	.015	31.781	7.794	138.794
1133.0	144528.9	8190.6	-1.426	122.611	45.392	.035	31.675	7.774	139.298
1134.0	144310.5	8166.8	-1.432	122.812	45.663	.000	31.579	7.754	139.808
1135.0	144091.8	8143.0	-1.439	123.014	46.043	-.026	31.520	7.734	140.322
1136.0	143872.5	8119.1	-1.448	123.218	46.451	.014	31.487	7.714	140.839
1137.0	143652.6	8095.3	-1.457	123.424	46.715	-.019	31.436	7.694	141.360
1138.0	143431.8	8071.4	-1.467	123.632	47.038	-.054	31.346	7.674	141.886
1139.0	143210.2	8047.6	-1.478	123.842	47.412	.018	31.261	7.654	142.416

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 39 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1140.0	142987.6	8023.7	-1.490	124.054	47.543	.034	31.184	7.634	142.954
1141.0	142764.0	7999.8	-1.501	124.267	47.473	.049	31.055	7.613	143.499
1142.0	142539.3	7976.2	-1.512	124.480	47.314	.094	30.862	7.593	144.058
1143.0	142313.7	7952.8	-1.524	124.691	47.069	.076	30.719	7.574	144.633
1144.0	142087.1	7929.4	-1.535	124.903	46.867	.106	30.654	7.554	145.216
1145.0	141859.6	7906.1	-1.545	125.113	46.606	.066	30.600	7.535	145.809
1146.0	141631.3	7882.9	-1.555	125.323	46.508	.035	30.536	7.515	146.410
1147.0	141402.4	7859.7	-1.564	125.534	46.546	-.002	30.462	7.495	147.016
1148.0	141172.7	7836.5	-1.574	125.745	46.762	-.002	30.389	7.476	147.630
1149.0	140942.1	7812.6	-1.586	125.953	47.017	.030	30.325	7.456	148.221
1150.0	140710.5	7798.2	-1.598	126.159	47.153	.031	30.268	7.435	148.802
1151.0	140477.8	7763.9	-1.612	126.366	47.267	.041	30.205	7.415	149.394
1152.0	140243.9	7739.7	-1.626	126.573	47.357	.024	30.142	7.394	149.998
1153.0	140008.6	7715.5	-1.641	126.780	47.453	.034	30.083	7.374	150.615
1154.0	139772.0	7691.3	-1.656	126.989	47.550	.026	30.004	7.381	150.246
1155.0	139534.1	7667.0	-1.671	127.200	47.696	.055	29.940	7.364	151.023
1156.0	139294.9	7642.7	-1.685	127.413	47.760	.099	29.890	7.347	151.806
1157.0	139054.5	7618.1	-1.697	127.628	47.566	.111	29.822	7.330	152.587
1158.0	138813.5	7593.3	-1.707	127.844	47.166	.105	29.737	7.313	153.369
1159.0	138571.8	7568.7	-1.717	128.058	46.697	.134	29.640	7.295	154.162
1160.0	138329.8	7544.2	-1.724	128.270	45.989	.148	29.538	7.278	154.964
1161.0	138087.7	7519.8	-1.728	128.479	44.978	.124	29.419	7.261	155.770
1162.0	137845.9	7495.7	-1.730	128.683	43.953	.044	29.311	7.244	156.584
1163.0	137604.9	7472.9	-1.727	128.905	43.217	-.043	29.193	7.227	157.419
1164.0	137365.2	7450.3	-1.721	129.130	42.756	-.105	29.083	7.210	158.253
1165.0	137126.9	7427.7	-1.714	129.355	42.615	-.101	28.989	7.193	159.078
1166.0	136890.2	7405.2	-1.708	129.580	42.536	-.101	28.869	7.176	159.897
1167.0	136654.8	7383.1	-1.703	129.804	42.462	-.117	28.646	7.160	160.721
1168.0	136420.6	7361.3	-1.700	130.025	42.329	-.139	28.457	7.143	161.556
1169.0	136187.3	7339.7	-1.698	130.244	42.179	-.209	28.363	7.127	162.394

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 40 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1170.0	135955.0	7318.1	-1.694	130.465	42.385	-.265	28.332	7.111	163.225
1171.0	135723.7	7296.4	-1.692	130.689	42.941	-.276	28.322	7.094	164.044
1172.0	135493.2	7274.6	-1.692	130.917	43.645	-.258	28.290	7.078	164.857
1173.0	135263.1	7252.9	-1.695	131.148	44.305	-.224	28.243	7.061	165.668
1174.0	135033.2	7231.1	-1.700	131.381	44.828	-.207	28.170	7.045	166.480
1175.0	134803.2	7209.4	-1.706	131.618	45.299	-.191	28.082	7.028	167.294
1176.0	134573.0	7187.6	-1.713	131.858	45.733	-.169	28.004	7.011	168.111
1177.0	134342.4	7165.6	-1.722	132.096	46.167	-.127	27.933	6.995	168.950
1178.0	134111.2	7143.6	-1.733	132.335	46.558	-.043	27.873	6.978	169.801
1179.0	133879.2	7121.5	-1.745	132.576	46.665	-.017	27.808	6.961	170.662
1180.0	133646.4	7099.6	-1.757	132.817	46.647	-.021	27.695	6.944	171.535
1181.0	133412.7	7077.8	-1.770	133.060	46.741	.049	27.570	6.928	172.422
1182.0	133178.0	7056.0	-1.783	133.302	46.738	.101	27.468	6.911	173.323
1183.0	132942.4	7034.4	-1.796	133.546	46.577	.130	27.381	6.895	174.238
1184.0	132705.9	7012.7	-1.808	133.789	46.344	.177	27.319	6.878	175.162
1185.0	132468.9	6990.9	-1.816	134.035	46.007	.209	27.251	6.862	176.086
1186.0	132231.6	6969.0	-1.823	134.281	45.795	.234	27.184	6.845	177.009
1187.0	131994.2	6947.2	-1.829	134.527	45.657	.269	27.083	6.828	177.940
1188.0	131756.6	6925.7	-1.837	134.771	45.392	.307	26.947	6.812	178.884
1189.0	131518.9	6904.2	-1.843	135.015	45.033	.348	26.829	6.796	179.838
1190.0	131281.2	6882.7	-1.847	135.258	44.632	.366	26.744	6.779	180.793
1191.0	131043.9	6860.4	-1.849	135.492	44.388	.371	26.685	6.757	181.440
1192.0	130807.0	6837.7	-1.851	135.723	44.257	.390	26.627	6.733	181.981
1193.0	130570.6	6815.1	-1.853	135.955	44.163	.443	26.535	6.709	182.515
1194.0	130334.9	6792.4	-1.853	136.188	44.018	.470	26.412	6.684	183.042
1195.0	130100.0	6769.8	-1.852	136.421	44.000	.500	26.309	6.660	183.560
1196.0	129865.8	6747.1	-1.851	136.656	43.899	.522	26.218	6.636	184.070
1197.0	129632.6	6724.5	-1.848	136.891	43.660	.470	26.134	6.612	184.567
1198.0	129400.5	6701.8	-1.846	137.127	43.655	.478	26.053	6.588	185.055
1199.0	129169.3	6679.4	-1.844	137.362	43.625	.507	25.951	6.564	185.544

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.

PAGE 41 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1200.0	128938.9	6657.2	-1.845	137.594	43.469	.447	25.862	6.540	186.039
1201.0	128709.3	6634.7	-1.842	137.830	43.268	.375	25.748	6.516	186.510
1202.0	128481.0	6612.0	-1.835	138.069	43.213	.377	25.658	6.492	186.955
1203.0	128254.2	6589.3	-1.828	138.309	43.174	.366	25.619	6.468	187.381
1204.0	128029.0	6566.5	-1.819	138.550	43.087	.346	25.565	6.444	187.788
1205.0	127805.6	6543.0	-1.810	138.795	42.987	.324	25.470	6.423	188.370
1206.0	127584.0	6519.3	-1.801	139.042	42.767	.275	25.314	6.404	189.061
1207.0	127364.1	6495.8	-1.792	139.288	42.505	.231	25.164	6.385	189.747
1208.0	127145.9	6472.5	-1.784	139.532	42.357	.205	25.030	6.367	190.428
1209.0	126929.4	6449.4	-1.777	139.775	42.358	.184	24.900	6.348	191.099
1210.0	126714.2	6426.4	-1.772	140.019	42.525	.163	24.813	6.330	191.763
1211.0	126500.2	6403.6	-1.768	140.264	42.917	.176	24.738	6.311	192.421
1212.0	126287.3	6380.7	-1.766	140.513	43.411	.166	24.679	6.293	193.066
1213.0	126075.1	6357.7	-1.766	140.767	43.777	.144	24.633	6.275	193.694
1214.0	125863.7	6334.7	-1.766	141.024	44.233	.159	24.585	6.256	194.307
1215.0	125652.9	6311.7	-1.768	141.282	44.453	.148	24.534	6.237	194.915
1216.0	125442.4	6288.8	-1.773	141.541	45.182	.402	24.446	6.219	195.523
1217.0	125231.8	6266.1	-1.784	141.806	46.744	1.226	24.332	6.200	196.141
1218.0	125020.7	6243.4	-1.792	142.067	44.838	.562	24.337	6.182	196.761
1219.0	124809.9	6220.5	-1.794	142.329	44.242	.310	24.319	6.163	197.363
1220.0	124599.6	6197.6	-1.796	142.593	44.070	.340	24.231	6.144	197.943
1221.0	124389.7	6175.1	-1.798	142.860	42.775	.436	24.197	6.125	198.482
1222.0	124180.9	6152.5	-1.786	143.117	39.949	.342	24.159	6.104	198.997
1223.0	123974.8	6130.0	-1.763	143.359	37.194	.078	24.017	6.084	199.491
1224.0	123772.3	6107.7	-1.734	143.587	36.134	-.019	23.864	6.065	199.965
1225.0	123573.4	6085.6	-1.707	143.817	36.367	.081	23.745	6.045	200.409
1226.0	123378.0	6063.5	-1.681	144.048	36.646	.138	23.709	6.025	200.821
1227.0	123186.0	6041.4	-1.656	144.281	36.810	.074	23.717	6.005	201.192
1228.0	122997.4	6019.3	-1.630	144.516	38.341	-.195	23.787	5.986	201.521
1229.0	122811.4	5996.9	-1.618	144.771	41.672	.028	23.820	5.965	201.804

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE. 42 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HOGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1230.0	122626.7	5974.4	-1.618	145.042	43.696	.218	23.795	5.945	202.069
1231.0	122442.3	5952.1	-1.624	145.317	44.509	.158	23.678	5.925	202.333
1232.0	122257.6	5930.1	-1.636	145.594	45.084	.103	23.553	5.905	202.615
1233.0	122072.1	5908.3	-1.652	145.873	45.603	.077	23.489	5.885	202.912
1234.0	121885.3	5886.5	-1.672	146.153	45.962	.032	23.474	5.866	203.222
1235.0	121697.1	5864.8	-1.693	146.434	46.185	-.015	23.483	5.846	203.544
1236.0	121507.2	5843.2	-1.716	146.717	46.296	-.069	23.485	5.827	203.881
1237.0	121315.7	5821.7	-1.739	147.002	46.384	-.181	23.478	5.808	204.282
1238.0	121122.5	5800.7	-1.762	147.294	46.946	-.159	23.487	5.790	204.814
1239.0	120927.6	5779.5	-1.787	147.591	47.652	-.076	23.488	5.772	205.353
1240.0	120730.6	5758.4	-1.815	147.894	48.018	-.062	23.469	5.755	205.908
1241.0	120531.5	5737.2	-1.843	148.199	48.243	-.007	23.431	5.737	206.478
1242.0	120330.3	5715.8	-1.870	148.509	48.513	.002	23.357	5.719	207.052
1243.0	120127.1	5694.5	-1.898	148.825	48.793	.127	23.268	5.701	207.648
1244.0	119921.8	5673.2	-1.926	149.141	48.682	.166	23.191	5.683	208.262
1245.0	119714.5	5651.7	-1.952	149.462	48.627	.220	23.115	5.665	208.886
1246.0	119505.4	5630.3	-1.977	149.783	48.411	.307	23.041	5.647	209.526
1247.0	119294.7	5609.2	-2.002	150.100	47.935	.343	22.939	5.629	210.200
1248.0	119082.2	5588.2	-2.027	150.414	47.317	.379	22.838	5.612	210.907
1249.0	118868.2	5567.5	-2.049	150.723	46.461	.327	22.747	5.594	211.641
1250.0	118653.0	5546.9	-2.068	151.027	46.004	.282	22.663	5.577	212.395
1251.0	118436.8	5526.3	-2.086	151.333	45.890	.301	22.592	5.560	213.162
1252.0	118219.6	5505.7	-2.103	151.639	45.780	.301	22.534	5.543	213.931
1253.0	118001.7	5485.0	-2.119	151.948	45.836	.320	22.491	5.526	214.700
1254.0	117783.0	5464.4	-2.136	152.258	46.050	.348	22.455	5.509	215.482
1255.0	117563.3	5443.9	-2.155	152.570	46.014	.429	22.423	5.491	216.273
1256.0	117342.6	5423.3	-2.172	152.879	45.435	.397	22.380	5.474	217.072
1257.0	117121.4	5402.8	-2.184	153.187	44.860	.256	22.305	5.457	217.876
1258.0	116899.9	5382.2	-2.197	153.495	44.920	.284	22.232	5.440	218.683
1259.0	116677.9	5361.8	-2.210	153.805	45.067	.323	22.155	5.423	219.494

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.
* PAGE 43

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1260.0	116455.5	5341.4	-2.224	154.116	44.910	.395	22.107	5.406	220.311
1261.0	116232.8	5320.7	-2.232	154.430	44.501	.367	22.069	5.389	221.109
1262.0	116010.4	5299.8	-2.235	154.747	44.391	.405	22.038	5.371	221.880
1263.0	115788.5	5278.9	-2.242	155.069	44.104	.637	22.024	5.354	222.641
1264.0	115567.3	5257.8	-2.234	155.384	41.240	.811	22.086	5.336	223.369
1265.0	115348.5	5236.7	-2.207	155.673	36.685	.591	21.956	5.318	224.070
1266.0	115133.8	5216.0	-2.165	155.931	32.455	.593	21.783	5.300	224.750
1267.0	114924.4	5195.5	-2.109	156.159	28.035	.584	21.631	5.283	225.349
1268.0	114721.4	5175.1	-2.040	156.355	23.488	.582	21.540	5.265	225.909
1269.0	114525.9	5154.7	-1.959	156.520	18.858	.586	21.534	5.246	226.350
1270.0	114339.1	5134.2	-1.865	156.652	14.069	.570	21.536	5.227	226.674
1271.0	114161.8	5113.5	-1.763	156.747	9.206	.557	21.509	5.208	226.877
1272.0	113994.5	5092.9	-1.656	156.805	4.386	.579	21.473	5.189	226.955
1273.0	113837.5	5072.2	-1.547	156.826	-.349	.640	21.438	5.170	226.908
1274.0	113690.7	5051.6	-1.442	156.810	-5.147	.692	21.404	5.150	226.743
1275.0	113553.4	5031.1	-1.343	156.757	-10.099	.727	21.378	5.131	226.467
1276.0	113424.9	5010.6	-1.255	156.665	-15.260	.705	21.345	5.111	226.089
1277.0	113304.1	4990.2	-1.180	156.537	-20.101	.707	21.294	5.092	225.623
1278.0	113189.7	4970.0	-1.121	156.375	-24.844	.770	21.255	5.072	225.092
1279.0	113080.0	4949.8	-1.081	156.179	-30.018	.691	21.222	5.053	224.510
1280.0	112973.3	4929.8	-1.063	155.951	-34.787	.716	21.173	5.034	223.901
1281.0	112867.6	4910.0	-1.071	155.694	-39.667	.750	21.125	5.014	223.294
1282.0	112760.4	4890.4	-1.108	155.409	-44.372	.491	21.108	4.996	222.718
1283.0	112649.5	4871.0	-1.166	155.107	-47.032	.362	21.041	4.977	222.196
1284.0	112533.6	4851.8	-1.235	154.798	-48.159	.497	20.987	4.959	221.744
1285.0	112412.1	4832.7	-1.312	154.483	-49.355	.485	20.951	4.940	221.356
1286.0	112284.3	4813.7	-1.395	154.161	-50.113	.546	20.981	4.922	221.038
1287.0	112150.0	4794.7	-1.482	153.833	-50.796	.496	21.019	4.904	220.790
1288.0	112008.8	4775.7	-1.573	153.500	-51.157	.457	21.046	4.886	220.617
1289.0	111860.6	4756.8	-1.664	153.163	-51.341	.448	21.083	4.868	220.514

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 44 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1290.0	111705.5	4737.8	-1.754	152.822	-51.374	.421	21.110	4.850	220.475
1291.0	111543.7	4718.8	-1.844	152.478	-51.404	.397	21.126	4.833	220.507
1292.0	111375.1	4699.7	-1.934	152.128	-51.195	.343	21.144	4.814	220.490
1293.0	111200.1	4680.5	-2.021	151.776	-50.758	.306	21.134	4.794	220.491
1294.0	111018.8	4661.4	-2.105	151.425	-50.050	.381	21.110	4.774	220.558
1295.0	110831.6	4642.5	-2.187	151.079	-49.471	.416	21.100	4.755	220.692
1296.0	110638.7	4623.6	-2.267	150.735	-48.908	.448	21.092	4.736	220.888
1297.0	110440.2	4604.9	-2.344	150.393	-48.380	.468	21.082	4.717	221.143
1298.0	110236.5	4586.2	-2.420	150.052	-47.921	.500	21.071	4.698	221.453
1299.0	110027.7	4567.6	-2.493	149.711	-47.468	.445	21.075	4.679	221.813
1300.0	109814.2	4549.0	-2.561	149.371	-46.575	.465	21.067	4.660	222.216
1301.0	109596.4	4530.4	-2.624	149.035	-45.611	.508	21.056	4.641	222.659
1302.0	109374.8	4511.8	-2.681	148.702	-44.752	.529	21.042	4.622	223.137
1303.0	109149.9	4493.2	-2.732	148.372	-43.843	.573	21.032	4.603	223.636
1304.0	108922.3	4474.4	-2.776	148.044	-42.879	.617	21.015	4.583	224.150
1305.0	108692.5	4455.8	-2.815	147.721	-41.887	.670	20.981	4.564	224.684
1306.0	108460.8	4437.1	-2.848	147.402	-40.966	.698	20.943	4.545	225.230
1307.0	108228.0	4418.2	-2.874	147.083	-40.596	.618	20.909	4.526	225.769
1308.0	107994.3	4399.0	-2.895	146.771	-40.117	.625	20.858	4.506	226.179
1309.0	107760.3	4379.7	-2.913	146.460	-39.672	.779	20.758	4.485	226.574
1310.0	107526.0	4360.5	-2.931	146.150	-38.740	1.193	20.638	4.465	226.977
1311.0	107291.3	4341.4	-2.953	145.837	-40.140	.608	20.560	4.444	227.385
1312.0	107055.8	4322.5	-2.978	145.523	-39.985	.576	20.432	4.424	227.813
1313.0	106819.5	4303.8	-3.004	145.215	-39.863	.709	20.300	4.404	228.262
1314.0	106582.2	4285.1	-3.035	144.901	-41.493	.853	20.207	4.385	228.725
1315.0	106343.0	4266.6	-3.084	144.566	-45.065	.648	20.171	4.365	229.203
1316.0	106100.3	4248.1	-3.157	144.208	-48.167	.271	20.072	4.345	229.716
1317.0	105852.9	4229.7	-3.242	143.842	-49.045	.292	19.920	4.325	230.286
1318.0	105600.1	4211.5	-3.332	143.474	-49.177	.448	19.773	4.306	230.927
1319.0	105341.7	4193.5	-3.426	143.103	-49.366	.540	19.656	4.287	231.635

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 45 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1320.0	105077.5	4175.6	-3.525	142.731	-50.051	.250	19.563	4.268	232.417
1321.0	104807.0	4157.8	-3.626	142.356	-48.470	-.024	19.468	4.249	233.268
1322.0	104531.4	4140.0	-3.699	142.003	-43.969	.131	19.438	4.230	234.165
1323.0	104252.9	4122.1	-3.740	141.672	-39.026	.421	19.404	4.211	235.074
1324.0	103973.8	4104.1	-3.753	141.369	-35.410	.596	19.349	4.191	235.973
1325.0	103695.6	4086.1	-3.752	141.082	-33.291	.548	19.286	4.172	236.853
1326.0	103419.1	4068.0	-3.740	140.806	-31.389	.570	19.222	4.153	237.706
1327.0	103145.1	4049.8	-3.718	140.541	-30.260	.552	19.154	4.134	238.512
1328.0	102874.1	4031.6	-3.691	140.278	-29.769	.427	19.084	4.114	239.272
1329.0	102606.3	4013.3	-3.663	140.019	-29.038	.395	18.989	4.095	239.991
1330.0	102341.8	3995.1	-3.631	139.766	-28.360	.403	18.870	4.075	240.666
1331.0	102080.9	3976.9	-3.598	139.519	-27.850	.431	18.767	4.056	241.339
1332.0	101823.5	3958.7	-3.565	139.276	-27.536	.445	18.671	4.037	242.015
1333.0	101569.4	3940.5	-3.533	139.035	-27.423	.466	18.568	4.018	242.651
1334.0	101318.8	3922.4	-3.503	138.791	-27.655	.443	18.466	3.999	243.242
1335.0	101071.4	3904.3	-3.473	138.544	-27.968	.342	18.352	3.980	243.793
1336.0	100827.0	3886.3	-3.447	138.295	-28.115	.374	18.232	3.961	244.311
1337.0	100585.5	3868.3	-3.425	138.046	-28.537	.381	18.129	3.942	244.798
1338.0	100346.5	3850.4	-3.406	137.789	-29.096	.340	18.036	3.923	245.250
1339.0	100109.8	3832.5	-3.390	137.529	-29.469	.296	17.951	3.905	245.670
1340.0	99875.2	3814.6	-3.376	137.264	-29.919	.280	17.851	3.886	246.053
1341.0	99642.6	3796.7	-3.365	136.992	-30.532	.191	17.757	3.867	246.406
1342.0	99411.9	3778.7	-3.355	136.714	-30.764	.201	17.673	3.848	246.726
1343.0	99182.8	3760.9	-3.348	136.434	-31.038	.143	17.572	3.830	247.024
1344.0	98955.2	3743.1	-3.346	136.155	-31.171	.126	17.476	3.811	247.314
1345.0	98728.7	3725.6	-3.347	135.878	-31.174	.161	17.392	3.793	247.602
1346.0	98503.1	3708.1	-3.351	135.600	-31.161	.207	17.315	3.775	247.878
1347.0	98278.4	3690.5	-3.355	135.321	-31.340	.214	17.282	3.756	248.112
1348.0	98054.5	3672.6	-3.359	135.040	-31.800	.226	17.251	3.738	248.282
1349.0	97831.4	3654.8	-3.366	134.750	-32.474	.118	17.204	3.720	248.429

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 46 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HOGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1350.0	97608.9	3636.9	-3.376	134.455	-32.793	.133	17.143	3.702	248.554
1351.0	97386.9	3619.1	-3.388	134.155	-33.254	.019	17.057	3.684	248.671
1352.0	97165.1	3601.4	-3.402	133.854	-33.373	.020	16.969	3.666	248.778
1353.0	96943.4	3583.7	-3.421	133.550	-33.637	.049	16.897	3.648	248.877
1354.0	96721.6	3566.0	-3.443	133.243	-33.931	-.044	16.846	3.630	248.993
1355.0	96499.6	3548.4	-3.464	132.935	-33.812	-.016	16.786	3.612	249.083
1356.0	96277.5	3530.8	-3.485	132.625	-33.901	-.005	16.756	3.594	249.164
1357.0	96055.2	3513.1	-3.507	132.313	-34.051	-.008	16.700	3.577	249.234
1358.0	95832.5	3495.7	-3.533	132.000	-34.104	-.005	16.604	3.559	249.317
1359.0	95609.4	3478.4	-3.563	131.691	-33.959	.040	16.465	3.541	249.426
1360.0	95385.4	3461.2	-3.596	131.382	-33.932	.056	16.397	3.524	249.546
1361.0	95160.6	3444.1	-3.630	131.069	-34.078	.036	16.373	3.507	249.666
1362.0	94934.9	3427.1	-3.666	130.754	-34.236	.021	16.343	3.489	249.717
1363.0	94708.1	3410.2	-3.703	130.435	-34.400	.017	16.318	3.471	249.711
1364.0	94480.3	3393.3	-3.741	130.114	-34.460	.018	16.300	3.453	249.708
1365.0	94251.4	3376.4	-3.779	129.793	-34.221	.064	16.283	3.435	249.706
1366.0	94021.6	3359.4	-3.813	129.472	-34.073	.118	16.264	3.417	249.698
1367.0	93791.0	3342.4	-3.846	129.142	-34.295	.113	16.244	3.398	249.674
1368.0	93559.8	3325.3	-3.880	128.807	-34.820	-.046	16.217	3.380	249.644
1369.0	93327.7	3308.3	-3.915	128.469	-34.704	-.092	16.176	3.362	249.618
1370.0	93095.1	3291.3	-3.945	128.129	-34.434	-.059	16.119	3.344	249.575
1371.0	92862.0	3274.2	-3.974	127.784	-34.720	-.114	16.055	3.326	249.521
1372.0	92628.5	3257.1	-4.005	127.432	-35.166	-.188	15.998	3.308	249.467
1373.0	92394.4	3240.0	-4.038	127.077	-35.369	-.238	15.934	3.289	249.405
1374.0	92159.7	3223.0	-4.072	126.724	-35.115	-.193	15.880	3.271	249.340
1375.0	91924.4	3206.0	-4.105	126.374	-34.743	-.117	15.838	3.253	249.283
1376.0	91688.6	3188.9	-4.139	126.029	-34.472	-.056	15.799	3.236	249.321
1377.0	91452.1	3171.7	-4.174	125.691	-34.371	-.015	15.755	3.219	249.493
1378.0	91215.0	3154.5	-4.212	125.353	-34.456	.002	15.705	3.203	249.671
1379.0	90977.1	3137.3	-4.252	125.012	-34.580	.015	15.671	3.187	249.857

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 47 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1380.0	90738.3	3120.3	-4.295	124.670	-34.779	-.005	15.633	3.170	250.050
1381.0	90498.5	3103.2	-4.335	124.320	-34.937	-.018	15.698	3.154	250.222
1382.0	90258.1	3086.0	-4.373	123.965	-34.967	-.015	15.716	3.137	250.369
1383.0	90017.0	3068.8	-4.410	123.611	-34.840	.025	15.689	3.121	250.511
1384.0	89775.3	3051.6	-4.447	123.252	-34.859	.030	15.602	3.104	250.653
1385.0	89533.1	3034.5	-4.487	122.885	-35.373	-.082	15.531	3.088	250.791
1386.0	89290.0	3017.5	-4.530	122.512	-35.848	-.195	15.512	3.072	250.932
1387.0	89046.2	3000.4	-4.571	122.133	-35.892	-.239	15.517	3.055	251.061
1388.0	88801.6	2983.4	-4.612	121.754	-35.565	-.228	15.457	3.039	251.188
1389.0	88556.5	2966.4	-4.651	121.383	-34.986	-.096	15.399	3.022	251.313
1390.0	88310.8	2949.5	-4.690	121.012	-34.857	.034	15.347	3.006	251.431
1391.0	88064.5	2932.5	-4.731	120.632	-35.510	-.047	15.286	2.989	251.536
1392.0	87817.4	2915.6	-4.777	120.245	-35.993	-.130	15.219	2.973	251.636
1393.0	87569.5	2898.7	-4.826	119.853	-36.169	-.175	15.148	2.957	251.743
1394.0	87320.5	2882.0	-4.877	119.459	-36.207	-.214	15.074	2.940	251.859
1395.0	87070.4	2865.3	-4.930	119.065	-36.027	-.206	15.009	2.924	251.991
1396.0	86819.2	2848.8	-4.983	118.678	-35.558	-.136	14.965	2.908	252.133
1397.0	86566.9	2832.2	-5.033	118.295	-34.934	.084	14.961	2.892	252.276
1398.0	86313.8	2815.6	-5.082	117.904	-35.592	.017	14.990	2.876	252.396
1399.0	86059.8	2798.8	-5.128	117.501	-35.765	-.049	15.053	2.859	252.477
1400.0	85805.3	2782.0	-5.169	117.099	-35.398	.037	15.035	2.843	252.534
1401.0	85550.4	2765.3	-5.213	116.702	-35.152	.103	14.972	2.827	252.602
1402.0	85294.8	2748.8	-5.262	116.314	-34.740	.210	14.909	2.810	252.690
1403.0	85038.5	2732.0	-5.312	115.919	-34.332	.203	14.846	2.794	252.688
1404.0	84781.7	2715.1	-5.348	115.530	-32.134	-.197	14.835	2.777	252.627
1405.0	84525.6	2698.0	-5.349	115.181	-27.120	.041	14.870	2.759	252.519
1406.0	84271.9	2680.9	-5.318	114.879	-22.848	-.057	14.892	2.742	252.348
1407.0	84021.9	2663.7	-5.260	114.630	-18.206	-.084	14.955	2.725	252.090
1408.0	83776.8	2646.4	-5.177	114.445	-13.131	-.056	14.998	2.707	251.737
1409.0	83537.7	2629.0	-5.075	114.332	-7.660	.148	14.958	2.690	251.283

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.

PAGE 48 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1410.0	83305.0	2611.6	-4.963	114.282	-3.009	.122	14.897	2.672	250.712
1411.0	83079.1	2594.1	-4.846	114.293	1.504	.047	14.836	2.655	250.032
1412.0	82859.9	2576.7	-4.733	114.368	6.015	-.054	14.763	2.637	249.253
1413.0	82646.9	2559.2	-4.631	114.509	10.656	-.151	14.707	2.619	248.384
1414.0	82439.7	2541.9	-4.542	114.719	16.095	-.081	14.695	2.602	247.439
1415.0	82237.3	2524.4	-4.473	115.012	21.722	.173	14.688	2.584	246.398
1416.0	82038.8	2506.8	-4.426	115.373	24.802	.349	14.593	2.566	245.269
1417.0	81843.4	2489.3	-4.394	115.747	25.884	.303	14.349	2.549	244.151
1418.0	81650.1	2472.2	-4.391	116.129	26.947	.281	14.111	2.532	243.111
1419.0	81457.8	2455.3	-4.402	116.521	27.961	.366	13.981	2.515	242.091
1420.0	81266.0	2438.6	-4.426	116.916	28.094	.338	13.942	2.499	241.088
1421.0	81074.4	2422.0	-4.452	117.306	27.874	.201	13.969	2.482	240.083
1422.0	80883.0	2405.4	-4.477	117.701	27.811	.155	13.973	2.466	239.063
1423.0	80691.8	2388.9	-4.504	118.097	27.702	.117	13.937	2.450	238.034
1424.0	80500.6	2372.4	-4.533	118.492	27.535	.089	13.927	2.433	236.997
1425.0	80309.6	2355.9	-4.561	118.883	27.086	.004	13.931	2.417	235.949
1426.0	80118.8	2339.5	-4.587	119.278	27.012	-.027	13.938	2.401	234.884
1427.0	79928.2	2323.0	-4.614	119.675	27.242	.023	13.890	2.385	233.802
1428.0	79737.7	2306.6	-4.644	120.068	26.832	-.015	13.886	2.368	232.704
1429.0	79547.4	2290.2	-4.669	120.457	26.116	-.097	13.911	2.352	231.579
1430.0	79357.6	2273.8	-4.690	120.840	25.560	-.145	13.905	2.336	230.443
1431.0	79168.2	2257.5	-4.711	121.215	24.953	-.203	13.870	2.320	229.302
1432.0	78979.3	2241.2	-4.734	121.585	24.411	-.249	13.841	2.304	228.146
1433.0	78790.9	2225.0	-4.756	121.951	24.104	-.241	13.819	2.288	226.981
1434.0	78602.9	2208.8	-4.779	122.314	23.779	-.216	13.797	2.272	225.816
1435.0	78415.4	2192.8	-4.798	122.687	23.382	-.168	13.771	2.256	224.687
1436.0	78228.6	2176.8	-4.817	123.059	23.002	-.097	13.705	2.240	223.553
1437.0	78042.3	2161.0	-4.837	123.427	22.554	-.030	13.653	2.224	222.415
1438.0	77856.6	2145.1	-4.855	123.796	22.156	.139	13.636	2.209	221.261
1439.0	77671.6	2129.4	-4.870	124.145	21.390	.259	13.576	2.193	220.102

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 49 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1440.0	77487.4	2113.9	-4.887	124.476	19.497	-.236	13.475	2.178	218.947
1441.0	77303.8	2098.5	-4.914	124.804	19.063	-.598	13.318	2.162	217.817
1442.0	77120.1	2083.4	-4.960	125.143	20.732	-.185	13.108	2.147	216.712
1443.0	76935.7	2068.5	-5.023	125.478	20.698	-.013	12.865	2.133	215.648
1444.0	76750.1	2053.8	-5.100	125.807	22.539	.569	12.644	2.118	214.627
1445.0	76552.8	2039.4	-5.191	126.153	22.889	.657	12.497	2.104	213.655
1446.0	76373.5	2025.0	-5.284	126.501	21.872	.354	12.416	2.090	212.705
1447.0	76182.1	2010.8	-5.382	126.846	21.686	.136	12.270	2.075	211.793
1448.0	75988.4	1996.9	-5.501	127.196	22.664	-.094	12.087	2.062	210.961
1449.0	75791.4	1983.1	-5.646	127.576	25.436	-.151	11.921	2.048	210.184
1450.0	75590.1	1969.6	-5.825	128.000	28.721	.138	11.808	2.035	209.478
1451.0	75383.8	1956.3	-6.021	128.444	30.178	.412	11.783	2.022	208.856
1452.0	75172.1	1943.1	-6.217	128.889	29.664	.254	11.896	2.009	208.287
1453.0	74955.3	1929.8	-6.405	129.336	29.257	.134	12.083	1.996	207.737
1454.0	74733.9	1916.4	-6.582	129.786	28.308	.166	12.234	1.982	207.211
1455.0	74508.7	1902.9	-6.727	130.216	24.980	.165	12.308	1.969	206.669
1456.0	74280.7	1889.4	-6.848	130.601	20.895	.067	12.208	1.956	206.146
1457.0	74050.4	1876.1	-6.962	130.921	16.755	.129	11.950	1.943	205.682
1458.0	73818.1	1863.3	-7.078	131.161	11.811	.048	11.652	1.930	205.305
1459.0	73583.5	1850.6	-7.201	131.326	7.239	-.256	11.375	1.918	204.991
1460.0	73346.3	1838.2	-7.338	131.453	5.063	-.301	11.077	1.905	204.716
1461.0	73106.1	1825.9	-7.492	131.561	4.138	-.140	10.808	1.894	204.508
1462.0	72862.4	1814.0	-7.660	131.653	3.247	-.007	10.495	1.882	204.389
1463.0	72614.6	1802.8	-7.865	131.729	2.252	.051	10.080	1.871	204.454
1464.0	72361.1	1792.2	-8.112	131.790	1.324	.068	9.672	1.861	204.712
1465.0	72100.9	1781.9	-8.389	131.838	.526	.034	9.512	1.851	205.102
1466.0	71833.8	1771.6	-8.661	131.873	.135	-.024	9.611	1.841	205.505
1467.0	71560.2	1761.0	-8.915	131.881	.117	-.060	9.779	1.830	205.820
1468.0	71280.8	1750.4	-9.150	131.882	-.050	-.108	9.906	1.819	206.165
1469.0	70996.3	1739.7	-9.371	131.873	-.629	-.240	9.989	1.808	206.526

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.
***** PAGE 50 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1470.0	70707.2	1728.9	-9.579	131.862	-1.133	-.425	10.061	1.797	206.887
1471.0	70413.8	1717.9	-9.775	131.859	-.504	-.370	10.124	1.786	207.253
1472.0	70116.8	1707.0	-9.962	131.863	-.009	-.261	10.144	1.775	207.648
1473.0	69816.2	1696.1	-10.144	131.880	-.272	-.249	10.121	1.764	208.081
1474.0	69512.3	1684.9	-10.321	131.925	-1.055	-.328	10.119	1.753	208.552
1475.0	69205.5	1673.7	-10.493	131.971	-1.594	-.480	10.123	1.742	209.013
1476.0	68895.8	1662.3	-10.656	132.033	-.864	-.338	10.160	1.731	209.469
1477.0	68533.9	1650.8	-10.808	132.115	-.048	-.148	10.158	1.720	209.896
1478.0	68269.9	1639.2	-10.959	132.217	.769	.108	10.105	1.709	210.337
1479.0	67953.8	1627.8	-11.107	132.333	1.366	.412	10.049	1.697	210.803
1480.0	67635.9	1615.5	-11.258	132.406	.722	.498	10.008	1.686	211.169
1481.0	67316.3	1603.0	-11.408	132.443	-.883	.186	9.990	1.674	211.515
1482.0	66995.1	1590.4	-11.550	132.480	-1.351	-.077	9.986	1.662	211.797
1483.0	66672.8	1577.7	-11.688	132.542	-.261	.087	9.970	1.650	212.050
1484.0	66349.3	1565.0	-11.823	132.622	.634	.395	9.918	1.638	212.304
1485.0	66024.9	1552.4	-11.953	132.683	.168	.462	9.859	1.626	212.549
1486.0	65699.7	1540.5	-12.075	132.730	-1.250	.223	9.820	1.614	213.003
1487.0	65373.9	1529.1	-12.192	132.778	-1.651	.051	9.774	1.603	213.564
1488.0	65047.4	1517.8	-12.306	132.836	-1.122	.056	9.715	1.593	214.127
1489.0	64720.5	1506.4	-12.416	132.916	-.317	.193	9.664	1.582	214.667
1490.0	64393.3	1495.0	-12.520	133.011	.361	.410	9.602	1.571	215.189
1491.0	64066.0	1483.6	-12.625	133.111	.349	.580	9.535	1.560	215.689
1492.0	63738.5	1470.9	-12.742	133.176	-.267	.605	9.502	1.548	215.720
1493.0	63411.0	1456.9	-12.860	133.198	-1.906	.272	9.501	1.534	215.339
1494.0	63083.8	1442.9	-12.972	133.212	-2.084	.019	9.447	1.520	214.865
1495.0	62757.0	1430.4	-13.070	133.258	-1.101	.124	9.357	1.507	214.777
1496.0	62430.7	1419.7	-13.153	133.327	-.279	.252	9.259	1.496	215.166
1497.0	62104.8	1409.2	-13.236	133.429	.769	.511	9.202	1.485	215.558
1498.0	61779.4	1398.8	-13.314	133.552	1.581	.868	9.142	1.475	215.953
1499.0	61454.6	1388.6	-13.387	133.675	2.323	1.270	9.140	1.464	216.368

* STS9BET USING AT78,NOAA ATM - INFRTIAL-BET9J13,NC0631 DYN. DATA. PAGE 51 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1500.0	61130.5	1378.3	-13.443	133.780	.687	1.102	9.214	1.454	216.747
1501.0	60807.9	1368.0	-13.491	133.857	-.592	.863	9.140	1.443	217.091
1502.0	60486.4	1358.0	-13.541	133.898	-1.455	.639	8.991	1.433	217.455
1503.0	60166.0	1348.1	-13.602	133.897	-2.899	.227	8.840	1.423	217.838
1504.0	59846.5	1337.9	-13.666	133.867	-3.989	-.259	8.680	1.412	218.095
1505.0	59528.0	1326.9	-13.741	133.868	-3.294	-.463	8.500	1.401	217.963
1506.0	59210.5	1315.8	-13.820	133.923	-1.074	-.181	8.410	1.389	217.776
1507.0	58894.0	1304.0	-13.887	133.973	-.713	-.060	8.440	1.377	217.307
1508.0	58579.2	1291.5	-13.929	134.013	-1.086	-.162	8.452	1.364	216.581
1509.0	58266.6	1279.2	-13.968	134.084	-.100	-.070	8.406	1.351	215.752
1510.0	57956.1	1266.7	-14.008	134.189	1.260	.187	8.524	1.337	214.847
1511.0	57648.2	1255.7	-13.981	134.267	2.135	.421	8.853	1.326	214.411
1512.0	57334.4	1244.9	-13.878	134.352	2.675	.655	9.254	1.314	213.924
1513.0	57046.2	1233.6	-13.699	134.440	2.433	.774	9.724	1.302	213.198
1514.0	56755.4	1221.8	-13.429	134.514	1.840	.758	10.154	1.290	212.187
1515.0	56473.8	1209.5	-13.097	134.581	1.415	.703	10.381	1.277	210.898
1516.0	56202.1	1197.1	-12.747	134.632	1.586	.730	10.469	1.264	209.398
1517.0	55940.3	1184.6	-12.389	134.662	1.010	.553	10.524	1.251	207.731
1518.0	55688.5	1170.0	-12.051	134.691	.073	.118	10.475	1.235	205.174
1519.0	55446.4	1154.9	-11.741	134.710	-.206	-.213	10.364	1.219	202.343
1520.0	55213.2	1140.0	-11.453	134.741	.626	-.343	10.202	1.203	199.430
1521.0	54988.4	1125.1	-11.198	134.838	2.464	-.173	10.020	1.188	196.441
1522.0	54771.0	1110.7	-10.967	135.011	3.879	.108	9.949	1.172	193.543
1523.0	54560.8	1096.7	-10.736	135.232	4.100	.313	10.013	1.158	190.682
1524.0	54357.6	1082.7	-10.492	135.451	2.987	.390	10.128	1.143	187.712
1525.0	54161.7	1068.5	-10.228	135.622	1.627	.400	10.158	1.128	184.631
1526.0	53973.0	1054.7	-10.002	135.780	.294	-.048	10.059	1.113	181.584
1527.0	53790.3	1041.5	-9.807	135.975	1.357	.313	10.141	1.099	178.730
1528.0	53613.5	1028.8	-9.590	136.212	2.773	1.056	10.206	1.086	175.916
1529.0	53442.5	1016.4	-9.405	136.445	1.552	1.269	10.070	1.073	173.177

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 52 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1530.0	53276.3	1003.4	-9.287	136.781	.193	1.600	9.862	1.059	170.468
1531.0	53113.6	992.2	-9.233	136.908	-.151	1.833	9.484	1.047	168.036
1532.0	52952.8	981.6	-9.268	137.001	-1.628	1.760	9.093	1.036	165.813
1533.0	52792.4	971.9	-9.375	137.009	-1.453	1.238	8.730	1.026	163.838
1534.0	52631.3	962.8	-9.547	137.160	.972	.816	8.370	1.016	162.061
1535.0	52468.2	954.3	-9.800	137.332	1.053	.832	7.998	1.007	160.506
1536.0	52301.7	946.3	-10.120	137.479	1.036	.847	7.726	.999	159.152
1537.0	52131.0	938.8	-10.474	137.657	1.072	.886	7.962	.991	157.936
1538.0	51956.7	931.2	-10.752	137.848	.696	1.088	8.152	.983	156.745
1539.0	51779.1	924.9	-11.052	137.912	-.069	1.236	8.136	.976	155.978
1540.0	51597.7	919.6	-11.372	137.894	-.941	1.386	8.188	.970	155.516
1541.0	51412.3	914.5	-11.693	137.849	-1.861	1.589	8.347	.965	155.192
1542.0	51222.8	910.1	-12.011	137.760	-4.837	1.715	8.565	.960	155.086
1543.0	51029.2	906.7	-12.342	137.557	-7.217	1.735	8.766	.956	155.367
1544.0	50831.0	904.3	-12.690	137.292	-8.542	1.748	9.076	.953	155.988
1545.0	50628.4	900.9	-12.921	136.913	-8.978	1.708	10.269	.950	156.280
1546.0	50425.2	896.6	-12.964	136.457	-9.733	1.389	10.540	.945	156.232
1547.0	50222.1	892.5	-13.019	135.965	-9.991	.987	10.430	.940	156.241
1548.0	50019.1	888.5	-13.089	135.450	-10.202	.444	10.156	.935	156.291
1549.0	49815.7	883.8	-13.194	134.986	-9.694	.037	10.042	.930	156.092
1550.0	49611.8	877.9	-13.314	134.616	-8.847	-.174	10.013	.923	155.414
1551.0	49407.7	871.9	-13.416	134.274	-7.959	-.272	10.083	.917	154.701
1552.0	49203.5	865.7	-13.514	133.965	-7.585	-.422	10.165	.910	153.915
1553.0	48999.6	859.3	-13.573	133.717	-6.297	-.205	10.485	.902	153.060
1554.0	48796.7	852.8	-13.581	133.620	-5.784	.203	10.877	.895	152.129
1555.0	48595.7	845.9	-13.536	133.627	-5.940	.631	11.369	.888	151.076
1556.0	48397.5	838.9	-13.421	133.623	-6.734	.904	11.807	.880	149.928
1557.0	48202.9	831.9	-13.285	133.552	-7.600	1.095	12.058	.872	148.740
1558.0	48011.6	825.2	-13.151	133.465	-8.656	1.316	12.329	.865	147.640
1559.0	47823.8	819.6	-13.001	133.284	-12.133	1.574	12.554	.859	146.886

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 53 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1560.0	47639.2	815.6	-12.866	132.808	-21.511	1.446	12.671	.854	146.563
1561.0	47456.1	811.8	-12.924	131.840	-29.564	.923	12.638	.849	146.292
1562.0	47272.1	808.5	-13.105	130.782	-32.135	.792	12.509	.845	146.229
1563.0	47086.2	805.4	-13.324	129.635	-35.122	.809	12.290	.842	146.239
1564.0	46897.0	803.0	-13.687	128.360	-39.337	.722	11.996	.839	146.504
1565.0	46702.4	801.8	-14.192	126.814	-42.703	.368	11.706	.837	147.297
1566.0	46500.6	801.1	-14.736	125.199	-43.501	.247	12.094	.836	148.322
1567.0	46292.9	799.9	-15.130	123.414	-43.877	.144	12.164	.834	149.182
1568.0	46080.2	799.3	-15.569	121.673	-43.931	.020	11.357	.833	150.329
1569.0	45860.8	799.3	-16.107	120.062	-45.228	.154	11.398	.832	151.777
1570.0	45634.3	798.5	-16.695	118.468	-47.926	.131	11.139	.831	152.913
1571.0	45399.1	798.3	-17.402	116.883	-48.969	.268	11.409	.830	154.328
1572.0	45155.1	797.8	-18.030	115.177	-49.541	.354	11.840	.829	155.698
1573.0	44903.5	796.8	-18.628	113.389	-50.400	.428	11.879	.827	156.943
1574.0	44644.0	792.5	-19.366	111.630	-52.084	.249	12.153	.821	156.820
1575.0	44376.4	788.0	-20.103	109.776	-53.625	.166	12.702	.816	156.625
1576.0	44100.8	783.0	-20.882	107.807	-56.326	-.043	13.403	.809	156.301
1577.0	43816.9	778.2	-21.655	105.584	-57.836	-.128	13.959	.804	156.138
1578.0	43525.6	774.4	-22.346	103.224	-57.244	.027	14.095	.799	156.641
1579.0	43227.3	770.6	-23.010	100.768	-57.402	-.171	14.331	.795	157.142
1580.0	42922.9	766.5	-23.601	98.191	-57.895	-.398	14.571	.790	157.573
1581.0	42613.1	765.5	-24.066	95.280	-58.296	-.597	14.450	.789	159.249
1582.0	42298.3	764.8	-24.505	92.342	-58.236	-.765	14.318	.787	161.115
1583.0	41978.8	764.4	-24.891	89.387	-57.365	-.839	14.405	.786	163.129
1584.0	41655.5	764.8	-25.132	86.380	-54.523	-.805	14.368	.786	165.588
1585.0	41330.5	765.7	-25.163	83.501	-52.694	-.516	14.175	.786	168.312
1586.0	41004.8	767.0	-25.208	80.639	-52.114	-.168	13.745	.787	171.314
1587.0	40677.8	767.6	-25.316	77.810	-51.863	-.099	13.245	.788	174.112
1588.0	40349.3	768.1	-25.435	74.980	-51.921	-.275	12.717	.788	176.938
1589.0	40019.0	769.3	-25.596	72.220	-51.922	-.428	11.864	.789	180.197

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.

PAGE 54 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1590.0	39685.4	771.5	-25.851	69.574	-51.766	-.578	11.256	.791	183.985
1591.0	39347.7	774.0	-26.127	66.996	-52.296	-.803	11.062	.793	188.047
1592.0	39005.5	776.8	-26.407	64.455	-51.296	-.884	10.702	.796	192.396
1593.0	38659.0	780.2	-26.589	62.198	-49.339	-.655	10.702	.799	196.991
1594.0	38309.7	783.2	-26.685	60.000	-49.476	-.424	10.813	.801	201.447
1595.0	37957.8	785.9	-26.816	57.807	-49.892	-.362	10.799	.803	205.893
1596.0	37603.4	791.1	-26.796	55.621	-49.853	-.024	10.857	.808	211.734
1597.0	37247.1	796.6	-26.764	53.470	-50.221	.238	10.703	.813	217.902
1598.0	36888.7	802.1	-26.733	51.273	-50.840	.501	10.829	.818	224.223
1599.0	36528.7	810.3	-26.551	48.638	-50.749	.504	10.566	.826	232.516
1600.0	36168.0	818.1	-26.254	46.062	-47.839	.432	10.179	.833	240.790
1601.0	35809.3	824.2	-25.781	43.500	-45.647	.273	9.540	.839	248.335
1602.0	35454.2	828.9	-25.406	40.993	-45.124	-.014	8.457	.844	255.128
1603.0	35101.1	833.6	-25.168	38.713	-45.119	-.329	7.903	.848	262.103
1604.0	34749.0	835.0	-25.014	36.516	-44.902	-.434	7.897	.849	266.928
1605.0	34399.0	832.9	-24.908	34.313	-43.955	-.316	7.880	.846	269.240
1606.0	34051.5	830.4	-24.772	32.089	-44.792	-.257	7.890	.842	271.275
1607.0	33707.3	826.1	-24.645	29.629	-47.450	-.338	8.007	.837	271.887
1608.0	33366.3	820.8	-24.616	27.080	-48.318	-.429	7.995	.830	271.572
1609.0	33027.7	815.1	-24.594	24.523	-48.789	-.526	8.098	.822	270.963
1610.0	32692.4	808.9	-24.535	21.783	-51.168	-.593	8.203	.814	269.942
1611.0	32359.8	802.7	-24.586	18.935	-52.371	-.556	7.960	.807	268.897
1612.0	32028.5	796.7	-24.724	16.141	-52.785	-.623	7.635	.799	267.946
1613.0	31697.5	790.7	-24.901	13.462	-50.520	-.489	7.712	.792	267.028
1614.0	31368.0	784.4	-24.875	10.880	-45.161	-.188	8.007	.785	266.035
1615.0	31043.2	777.9	-24.608	8.232	-45.697	-.292	8.308	.777	264.740
1616.0	30724.5	772.6	-24.314	5.635	-44.147	-.401	8.082	.770	263.923
1617.0	30411.5	769.1	-23.946	3.460	-42.713	-.338	8.016	.765	263.988
1618.0	30104.3	765.9	-23.655	1.451	-42.636	-.173	7.779	.760	264.130
1619.0	29801.2	761.8	-23.441	-.652	-42.417	.071	8.065	.755	263.717

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 55 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1620.0	29502.7	755.1	-23.285	-3.280	-42.224	-.100	7.796	.747	261.705
1621.0	29208.2	749.3	-23.195	-5.810	-41.224	-.167	7.615	.740	260.192
1622.0	28916.7	743.9	-23.145	-8.274	-40.771	-.223	7.456	.733	259.014
1623.0	28627.6	739.3	-23.103	-10.693	-40.468	-.329	7.406	.728	258.123
1624.0	28340.9	734.9	-23.038	-13.155	-40.394	-.438	7.517	.722	257.448
1625.0	28057.2	730.5	-22.862	-15.757	-40.218	-.645	7.468	.717	256.673
1626.0	27777.4	726.9	-22.673	-18.219	-39.819	-.780	7.098	.712	256.390
1627.0	27500.6	724.5	-22.533	-20.264	-39.519	-.764	6.926	.708	256.965
1628.0	27226.2	722.1	-22.423	-22.250	-39.333	-.753	6.819	.705	257.535
1629.0	26953.5	719.8	-22.376	-24.166	-39.157	-.684	6.962	.702	258.199
1630.0	26682.6	717.5	-22.244	-26.209	-39.113	-.603	7.417	.699	258.680
1631.0	26414.4	714.9	-22.056	-28.374	-39.279	-.572	7.553	.695	258.880
1632.0	26149.6	712.0	-21.855	-30.587	-39.547	-.670	7.308	.691	258.862
1633.0	25887.8	709.1	-21.696	-32.766	-39.753	-.778	7.423	.687	258.775
1634.0	25629.3	706.3	-21.452	-35.061	-40.569	-.865	7.550	.683	258.903
1635.0	25374.5	703.5	-21.245	-37.395	-41.489	-.824	7.613	.680	259.057
1636.0	25122.9	700.6	-21.060	-39.791	-41.851	-.694	7.651	.676	259.092
1637.0	24874.2	697.7	-20.898	-42.214	-41.988	-.666	7.954	.673	259.137
1638.0	24628.8	693.9	-20.646	-44.708	-41.685	-.654	8.223	.669	257.616
1639.0	24387.9	690.0	-20.397	-47.146	-40.687	-.532	8.159	.664	255.886
1640.0	24150.8	685.9	-20.126	-49.540	-40.058	-.439	8.371	.659	254.061
1641.0	23918.8	681.7	-19.827	-51.969	-39.660	-.360	8.219	.655	252.196
1642.0	23690.7	677.0	-19.619	-54.286	-37.608	-.422	8.120	.649	250.932
1643.0	23466.5	672.5	-19.415	-56.450	-36.432	-.448	8.199	.644	250.085
1644.0	23246.5	667.9	-19.081	-58.713	-36.122	-.463	8.739	.639	249.100
1645.0	23032.9	662.8	-18.540	-61.122	-35.386	-.532	8.747	.634	247.610
1646.0	22826.1	658.3	-18.204	-63.257	-34.581	-.532	8.192	.629	246.491
1647.0	22622.9	655.2	-18.004	-65.184	-34.143	-.318	8.270	.626	246.021
1648.0	22423.2	652.2	-17.728	-67.192	-33.791	-.255	8.456	.623	245.599
1649.0	22227.4	649.4	-17.438	-69.143	-32.557	-.221	8.314	.620	245.267

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 56 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1650.0	22035.3	646.8	-17.185	-71.012	-31.841	-.243	8.198	.617	245.053
1651.0	21846.4	644.4	-15.973	-72.787	-31.130	-.230	8.176	.615	244.926
1652.0	21660.3	641.8	-16.777	-74.491	-30.458	-.150	8.126	.612	244.421
1653.0	21476.9	639.5	-16.600	-76.221	-30.515	-.257	8.032	.609	244.092
1654.0	21295.8	637.4	-16.450	-77.920	-30.412	-.396	7.968	.607	243.899
1655.0	21116.6	635.7	-16.344	-79.550	-30.023	-.365	7.965	.604	243.963
1656.0	20939.0	634.0	-16.203	-81.212	-29.958	-.322	8.133	.602	244.086
1657.0	20763.9	632.5	-15.959	-82.974	-30.018	-.379	8.199	.601	244.280
1658.0	20591.6	631.1	-15.753	-84.741	-30.256	-.527	8.010	.599	244.519
1659.0	20421.4	629.7	-15.622	-86.467	-30.544	-.633	7.946	.597	244.778
1660.0	20253.1	628.0	-15.418	-88.249	-30.538	-.629	8.261	.595	244.801
1661.0	20088.4	625.8	-15.040	-90.156	-30.658	-.679	8.411	.593	244.347
1662.0	19928.2	623.6	-14.713	-92.037	-30.754	-.689	8.116	.590	243.820
1663.0	19770.8	621.7	-14.576	-93.785	-30.760	-.657	7.933	.588	243.582
1664.0	19615.1	619.9	-14.452	-95.537	-30.784	-.563	8.131	.586	243.334
1665.0	19461.5	618.0	-14.222	-97.390	-30.904	-.605	8.352	.583	242.906
1666.0	19311.1	615.9	-13.963	-99.251	-30.968	-.625	8.322	.581	242.388
1667.0	19163.5	613.9	-13.768	-101.074	-30.804	-.600	8.349	.579	241.862
1668.0	19018.2	612.0	-13.592	-102.867	-30.429	-.460	8.423	.576	241.376
1669.0	18875.3	609.8	-13.358	-104.666	-29.636	-.365	8.570	.574	240.719
1670.0	18735.4	607.5	-13.137	-106.588	-29.665	-.509	8.426	.572	240.023
1671.0	18598.2	605.5	-12.912	-108.550	-29.274	-.679	8.423	.569	239.489
1672.0	18464.0	603.4	-12.622	-110.466	-28.068	-.716	8.267	.567	238.919
1673.0	18332.4	601.7	-12.541	-112.172	-27.560	-.756	7.770	.565	238.662
1674.0	18200.7	600.6	-12.656	-113.734	-27.255	-.696	7.795	.564	238.840
1675.0	18068.3	599.5	-12.659	-115.300	-26.233	-.509	8.092	.563	239.020
1676.0	17936.9	598.2	-12.533	-116.904	-25.709	-.397	8.166	.562	239.047
1677.0	17807.1	596.5	-12.416	-118.475	-25.481	-.349	7.903	.560	238.733
1678.0	17678.0	594.6	-12.511	-119.903	-25.873	-.320	7.550	.558	238.164
1679.0	17547.2	593.0	-12.761	-121.318	-27.243	-.396	7.332	.556	237.872

* STS9BET USING AT78,NOAA ATM - INFRITIAL-BET9J13,NC0631 DYN. DATA.
***** PAGE 57 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1680.0	17414.2	591.6	-13.007	-122.830	-28.659	-.441	7.319	.554	237.769
1681.0	17279.2	590.3	-13.203	-124.470	-30.104	-.417	7.423	.553	237.709
1682.0	17142.6	589.0	-13.402	-126.226	-31.257	-.432	7.335	.551	237.648
1683.0	17003.9	587.9	-13.662	-128.000	-31.739	-.396	7.195	.550	237.808
1684.0	16862.7	586.9	-13.948	-129.829	-32.165	-.422	7.091	.549	238.102
1685.0	16718.8	588.0	-14.169	-131.468	-32.705	-.325	7.213	.549	240.019
1686.0	16572.6	589.1	-14.364	-133.145	-34.447	-.325	7.338	.550	242.014
1687.0	16424.3	590.2	-14.504	-134.981	-35.590	-.210	7.621	.551	243.966
1688.0	16274.7	591.1	-14.603	-136.926	-36.009	-.150	7.514	.551	245.799
1689.0	16123.5	591.9	-14.731	-138.864	-35.611	-.067	7.540	.551	247.586
1690.0	15971.1	592.7	-14.849	-140.762	-35.049	-.097	7.344	.552	249.384
1691.0	15816.9	593.0	-15.011	-142.619	-35.044	-.129	7.464	.552	250.842
1692.0	15661.5	591.5	-15.106	-144.730	-35.297	-.237	7.610	.550	250.710
1693.0	15505.8	589.9	-15.170	-146.891	-35.387	-.241	7.504	.548	250.488
1694.0	15349.6	588.4	-15.281	-149.052	-35.441	-.327	7.457	.546	250.418
1695.0	15192.8	586.9	-15.346	-151.224	-35.101	-.389	7.567	.545	250.306
1696.0	15035.9	585.4	-15.387	-153.318	-34.108	-.319	7.373	.543	250.134
1697.0	14878.5	584.1	-15.539	-155.291	-32.742	-.133	7.080	.541	250.213
1698.0	14719.5	584.7	-15.702	-157.213	-31.620	-.131	6.933	.541	251.958
1699.0	14559.1	585.8	-15.777	-159.080	-29.775	-.099	6.808	.542	254.069
1700.0	14397.5	586.9	-15.875	-160.834	-28.240	-.198	6.552	.543	256.291
1701.0	14234.7	588.2	-15.953	-162.446	-25.430	-.242	6.483	.544	258.698
1702.0	14071.2	589.5	-15.930	-163.895	-21.993	-.241	6.384	.544	261.038
1703.0	13907.5	590.7	-15.955	-165.088	-17.813	-.184	6.205	.545	263.427
1704.0	13743.2	592.0	-15.913	-166.091	-13.835	-.182	6.217	.546	265.952
1705.0	13579.8	593.0	-15.793	-166.903	-10.700	-.256	5.919	.547	268.271
1706.0	13416.2	594.1	-15.855	-167.507	-8.673	-.326	5.619	.547	270.661
1707.0	13251.5	595.0	-15.980	-168.000	-6.268	-.281	5.371	.548	272.881
1708.0	13084.9	595.9	-16.167	-168.351	-3.301	-.241	5.288	.548	275.140
1709.0	12916.4	596.7	-16.325	-168.576	-2.041	-.247	5.166	.549	277.401

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.

PAGE . 58 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1710.0	12745.8	596.9	-16.529	-168.775	-1.600	-.244	5.173	.549	279.221
1711.0	12573.6	596.7	-16.653	-168.934	.432	-.116	5.120	.548	280.676
1712.0	12400.4	596.2	-16.790	-169.017	1.949	-.075	4.884	.548	281.936
1713.0	12225.6	595.3	-16.977	-169.090	1.988	-.184	4.884	.547	282.853
1714.0	12049.7	594.0	-17.043	-169.157	2.371	-.303	4.976	.546	283.406
1715.0	11873.6	592.8	-17.216	-169.171	3.230	-.449	4.646	.544	284.027
1716.0	11695.2	593.0	-17.422	-169.065	3.101	-.469	4.665	.544	285.979
1717.0	11514.9	593.5	-17.675	-168.938	3.462	-.409	4.292	.545	288.225
1718.0	11330.8	594.3	-18.106	-168.816	4.208	-.272	4.135	.545	290.822
1719.0	11142.2	595.0	-18.496	-168.639	5.260	-.237	4.306	.546	293.430
1720.0	10950.3	595.6	-18.760	-168.348	4.507	-.147	4.598	.546	295.934
1721.0	10756.6	595.4	-18.820	-168.083	2.694	.206	4.889	.546	297.674
1722.0	10563.3	594.2	-18.742	-167.992	1.307	.378	5.185	.544	298.401
1723.0	10372.5	592.1	-18.395	-167.956	.523	.274	5.232	.542	298.181
1724.0	10185.7	589.5	-18.148	-167.965	-.248	.141	5.196	.540	297.404
1725.0	10002.8	586.1	-17.717	-168.046	-1.113	-.081	5.411	.536	295.745
1726.0	9825.9	581.7	-17.216	-168.159	-1.649	-.295	5.428	.532	293.028
1727.0	9655.4	576.0	-16.707	-168.101	-1.183	-.282	5.383	.527	288.801
1728.0	9490.7	570.7	-16.416	-168.006	-.484	-.205	5.061	.521	284.929
1729.0	9328.8	566.3	-16.275	-167.875	-.552	-.192	5.524	.517	282.008
1730.0	9171.3	562.3	-15.804	-167.745	-.573	-.203	5.635	.513	279.389
1731.0	9018.2	559.4	-15.588	-167.570	.214	-.064	5.377	.510	277.766
1732.0	8866.8	557.4	-15.581	-167.350	.999	.089	5.318	.508	277.135
1733.0	8715.0	556.5	-15.724	-167.326	.993	-.049	5.421	.507	277.436
1734.0	8562.1	555.8	-15.821	-167.341	.922	-.315	5.639	.506	277.967
1735.0	8409.2	555.0	-15.809	-167.280	1.970	-.358	5.701	.505	278.388
1736.0	8256.7	554.0	-15.765	-167.128	2.402	-.324	5.779	.504	278.716
1737.0	8105.3	552.7	-15.626	-166.988	2.047	-.220	5.849	.502	278.599
1738.0	7956.1	550.7	-15.409	-166.884	1.697	-.258	5.695	.500	277.744
1739.0	7808.9	548.6	-15.359	-166.756	1.321	-.095	5.399	.498	276.881

* STS9BET USING AT79,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 59 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1740.0	7661.9	547.4	-15.415	-166.676	.680	.097	5.342	.497	276.871
1741.0	7514.6	546.5	-15.513	-166.678	-.245	.082	5.261	.496	277.081
1742.0	7366.4	545.7	-15.623	-166.680	-.529	.000	5.389	.495	277.417
1743.0	7218.2	544.5	-15.570	-166.718	-1.203	.029	5.195	.493	277.461
1744.0	7069.7	543.7	-15.869	-166.800	-1.678	-.006	4.733	.492	277.834
1745.0	6917.9	543.0	-16.153	-166.887	-1.416	-.074	5.150	.491	278.312
1746.0	6765.2	541.6	-16.192	-166.932	-.664	-.056	5.343	.490	278.004
1747.0	6613.2	539.4	-16.130	-166.962	-.619	-.053	5.417	.487	277.016
1748.0	6462.7	536.9	-16.015	-167.045	-.964	-.141	5.181	.485	275.592
1749.0	6313.0	534.8	-16.127	-167.116	-.437	-.247	5.104	.483	274.602
1750.0	6163.0	532.9	-16.146	-167.126	.168	-.270	5.261	.481	273.800
1751.0	6013.5	531.1	-16.193	-167.140	.009	-.278	5.131	.479	273.051
1752.0	5863.3	529.4	-16.397	-167.177	-.268	-.374	4.909	.477	272.502
1753.0	5711.2	528.5	-16.684	-167.198	-.088	-.491	5.052	.476	272.685
1754.0	5557.5	527.4	-16.784	-167.178	.199	-.449	5.340	.474	272.730
1755.0	5404.1	526.2	-16.743	-167.172	.244	-.370	5.384	.473	272.713
1756.0	5251.4	525.1	-15.666	-167.162	-.064	-.316	5.472	.472	272.763
1757.0	5100.3	524.0	-16.469	-167.134	-.236	-.213	5.602	.471	272.732
1758.0	4951.5	522.9	-16.240	-167.120	-.657	-.014	5.616	.469	272.745
1759.0	4804.6	521.4	-16.121	-167.180	-1.114	.085	5.544	.468	272.334
1760.0	4659.0	519.2	-16.006	-167.330	-1.357	.177	5.716	.465	271.181
1761.0	4515.4	517.4	-15.870	-167.520	-1.515	.083	5.646	.464	270.387
1762.0	4372.6	516.4	-15.877	-167.669	-.113	.127	5.622	.462	270.462
1763.0	4229.4	516.2	-16.020	-167.768	.451	.001	5.579	.462	271.409
1764.0	4084.6	516.5	-16.193	-167.824	1.225	-.152	5.900	.462	272.826
1765.0	3938.7	516.7	-16.284	-167.798	1.256	-.286	6.097	.462	274.277
1766.0	3792.2	516.6	-16.284	-167.767	1.431	-.218	6.181	.462	275.376
1767.0	3646.1	516.2	-16.246	-167.862	.105	-.297	6.386	.461	276.229
1768.0	3501.3	515.6	-15.922	-168.071	-1.371	-.467	7.052	.461	276.745
1769.0	3351.4	514.1	-15.226	-168.402	-2.028	-.674	7.174	.459	276.375

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA. PAGE 60 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1770.0	3227.6	512.6	-14.719	-168.714	-1.374	-.910	6.834	.458	275.912
1771.0	3097.4	511.2	-14.370	-168.910	-.269	-1.057	7.370	.456	275.534
1772.0	2972.9	509.1	-13.393	-168.954	.419	-.987	8.091	.454	274.326
1773.0	2859.0	506.2	-12.261	-168.938	-.052	-.826	8.126	.452	272.238
1774.0	2754.8	502.9	-11.174	-168.933	-.843	-.563	7.896	.449	269.625
1775.0	2660.9	499.3	-10.114	-168.969	-.862	-.230	7.870	.445	266.646
1776.0	2575.8	495.4	-9.243	-169.064	-1.349	-.098	8.259	.442	263.222
1777.0	2499.3	490.9	-8.209	-169.209	-2.048	-.057	8.628	.438	259.187
1778.0	2432.6	485.1	-7.200	-169.482	-2.480	-.115	8.657	.433	253.730
1779.0	2374.4	480.1	-6.278	-169.734	-2.954	-.212	8.623	.428	249.022
1780.0	2324.5	474.7	-5.390	-170.023	-3.424	-.343	8.608	.423	243.924
1781.0	2281.6	468.7	-4.736	-170.314	-3.033	-.319	8.535	.418	238.071
1782.0	2243.7	461.9	-4.241	-170.536	-1.301	-.270	8.820	.412	231.561
1783.0	2210.8	454.6	-3.595	-170.587	-.292	-.254	9.180	.405	224.414
1784.0	2184.0	447.1	-2.900	-170.590	.315	-.298	9.341	.399	217.093
1785.0	2162.8	439.3	-2.183	-170.514	1.549	-.189	9.627	.392	209.633
1786.0	2147.3	431.5	-1.634	-170.365	2.125	-.219	9.526	.385	202.232
1787.0	2135.3	423.6	-1.117	-170.166	2.132	-.301	9.881	.378	194.937
1788.0	2127.9	415.7	-.658	-169.983	1.699	-.330	9.489	.371	187.683
1789.0	2122.4	408.1	-.526	-169.867	1.126	-.401	9.535	.364	180.929
1790.0	2118.0	400.6	-.338	-169.770	.473	-.477	9.604	.357	174.295
1791.0	2114.6	393.3	-.339	-169.737	-.720	-.481	9.611	.351	168.037
1792.0	2111.1	386.2	-.287	-169.801	-1.336	-.451	9.950	.344	162.043
1793.0	2108.7	379.0	-.081	-169.897	-1.424	-.452	10.026	.338	156.060
1794.0	2107.2	372.1	-.043	-170.008	-1.566	-.469	9.973	.332	150.364
1795.0	2105.8	365.3	-.046	-170.117	-1.440	-.447	10.118	.326	144.941
1796.0	2104.3	358.6	-.057	-170.186	-1.173	-.405	10.320	.320	139.677
1797.0	2102.9	352.0	-.004	-170.241	-.918	-.336	10.495	.314	134.568
1798.0	2102.2	345.3	.089	-170.294	-.816	-.317	10.581	.308	129.525
1799.0	2101.5	339.0	.025	-170.332	-.647	-.314	10.511	.302	124.850

* STS9BET USING AT78,NOAA ATM - INERTIAL-BET9J13,NC0631 DYN. DATA.

PAGE 61 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1800.0	2100.5	332.3	.071	-170.332	-.148	-.215	9.922	.296	119.955
1801.0	2100.3	326.1	.154	-170.291	.079	-.165	9.064	.291	115.503
1802.0	2100.2	320.7	.184	-170.234	.026	-.121	8.529	.286	111.688
1803.0	2100.4	315.3	.248	-170.208	.030	-.090	8.344	.281	107.950
1804.0	2100.8	309.9	.221	-170.179	.226	-.111	8.354	.276	104.310
1805.0	2101.0	304.5	.243	-170.110	.196	-.099	8.248	.272	100.743
1806.0	2101.3	299.3	.194	-170.059	.261	-.064	7.995	.267	97.297
1807.0	2100.8	294.2	-.003	-170.003	.219	-.081	7.608	.262	94.004
1808.0	2100.1	288.4	.100	-169.924	.092	-.000	6.397	.257	90.347
1809.0	2099.9	282.3	.169	-169.897	.161	.096	5.663	.252	86.550
1810.0	2099.9	275.8	.191	-169.878	.158	.047	4.962	.246	82.624
1811.0	2100.0	268.6	.226	-169.827	.088	-.003	4.268	.240	78.370
1812.0	2100.3	260.8	.204	-169.751	.125	-.005	3.532	.233	73.893
1813.0	2100.3	251.6	.219	-169.673	.074	.025	2.059	.224	68.734
1814.0	2100.4	240.3	.123	-169.630	.134	.025	-1.233	.214	62.735
1815.0	2099.8	229.2	-.085	-169.556	.072	-.148	-3.323	.204	57.081
1816.0	2099.0	220.4	.134	-169.390	.071	-.250	-3.689	.197	52.753
1817.0	2099.1	213.3	.239	-169.227	.080	-.219	-3.809	.190	49.417
1818.0	2099.3	206.1	.234	-169.109	.068	-.063	-3.832	.184	46.132
1819.0	2099.5	199.7	.202	-169.081	.094	.268	-3.842	.178	43.329
1820.0	2099.6	192.3	.228	-169.154	.121	.659	-3.884	.172	40.172
1821.0	2099.8	184.5	.235	-169.535	.186	1.048	-3.919	.165	36.968
1822.0	2100.0	177.3	.264	-170.044	.214	1.251	-3.943	.158	34.138
1823.0	2100.2	170.1	.239	-170.571	.183	1.186	-3.936	.152	31.428
1824.0	2100.4	162.1	.253	-171.046	.209	.865	-3.969	.145	28.556
1825.0	2100.6	153.0	.258	-171.267	.146	.587	-3.995	.136	25.425
1826.0	2100.8	144.2	.267	-171.449	.120	.460	-4.031	.129	22.577
1827.0	2101.0	137.2	.258	-171.537	.132	.469	-3.984	.122	20.459
1828.0	2101.2	131.2	.249	-171.674	.124	.303	-3.957	.117	18.698
1829.0	2101.3	125.4	.297	-171.906	.126	.635	-4.005	.112	17.068

* STS9BET USING AT78,NOAA ATM - INFRTRIAL-BET9J13,NC0631 DYN. DATA. PAGE 62 *

TIME (SEC)	ALTDE (FT)	VELA (FPS)	GAMA (DEG)	HDGA (DEG)	SIGMAA (DEG)	BETAA (DEG)	ALPHAA (DEG)	MACHA (-)	QA (PSF)
1830.0	2101.6	120.6	.294	-172.507	.367	.971	-4.030	.108	15.796
1831.0	2101.8	115.1	.254	-173.022	.271	.208	-3.985	.103	14.384
1832.0	2102.0	110.2	.295	-172.769	-.047	-.848	-3.959	.098	13.202
1833.0	2102.2	106.8	.333	-171.932	-.089	-1.071	-4.040	.095	12.391
1834.0	2102.5	103.7	.299	-171.128	-.084	-1.055	-4.006	.092	11.679
1835.0	2102.7	99.5	.303	-170.363	-.101	-.903	-4.041	.089	10.744
1836.0	2102.9	94.6	.278	-169.700	-.037	-.323	-4.023	.084	9.723
1837.0	2103.0	89.6	.257	-169.427	.035	-.107	-4.007	.080	8.720
1838.0	2103.1	83.8	.271	-169.359	.034	.096	-4.028	.075	7.636
1839.0	2103.2	77.8	.226	-169.426	.071	.216	-4.012	.069	6.567
1840.0	2103.3	70.9	.292	-169.655	.069	.010	-4.083	.063	5.462
1841.0	2103.4	63.6	.266	-169.849	.066	-.127	-4.082	.057	4.396
1842.0	2103.5	56.4	.228	-169.996	.056	-.236	-4.043	.050	3.453
1843.0	2103.6	49.8	.410	-170.128	.018	-.385	-4.182	.044	2.691
1844.0	2103.8	43.7	.434	-170.110	.062	-.456	-4.226	.039	2.076
1845.0	2104.0	38.1	.411	-170.171	.067	-.542	-4.201	.034	1.578
1846.0	2104.1	32.7	.554	-170.423	.051	-.769	-4.348	.029	1.161
1847.0	2104.4	27.3	.561	-170.434	.058	-.846	-4.355	.024	.810
1848.0	2104.5	22.9	.398	-170.575	.074	-.996	-4.170	.020	.571
1849.0	2104.6	17.6	.945	-171.160	.027	-1.593	-4.745	.016	.337
1850.0	2104.8	12.5	.381	-171.593	.066	-1.939	-4.134	.011	.170
1851.0	2104.9	8.1	2.356	-173.238	-.073	-3.378	-6.120	.007	.071
1852.0	2105.2	2.9	3.630	179.488	-.606	-10.499	-7.469	.003	.009

APPENDIX D
STS-9 Source and Output Products for Archival

D.1 STS-9 Output Products

(a) FILES

<u>NAME</u>	<u>USER CATALOG</u>	<u>DESCRIPTION</u>
BET9J13	169750N	Final reconstructed trajectory (40 word format per AMA 81-1)
STS9BET	274885C	Final Extended BET (66 word format per AMA 81-11)
NAVNET9	389102C	STS-9 onboard nav BET (66 word format)
FLAIR9	581199C	Final LAIRS file
TRWSTS9	274885C	Reformatted JSC/TRW BET (66 word format)

(b) TAPES

<u>REEL NO.</u>	<u>DESCRIPTION</u>
NL0624	STS-9 AEROBET (201 words per AMA 82-9)
NL0701	Duplicate of above
NL0606	25 Hz IMU2 GTFILE (62 words per AMA 81-20)
ND1162	25 Hz ACIP GTFILEs (18 CDC System Records, 62 word format)
NC0619	Final STS-9 residuals for BET9J13
NC0626	Edited tracking tape
NC0625	1 Hz OI-2 for AEROBET
NC0631	20 Hz IMU2 file in body axes for STS9BET, AEROBET and GTFILE (calibrated per BET9J13 solution)
NK1117	25 Hz "calibrated" ACIP file (epoch: 83843.0 ^S GMT)
NX1004	Dynamic data (input for trajectory reconstruction) - 20 Hz IMU2 data in platform coordinates (first CDC record)
NW1036	Master ACIP cal input tape
NC0714	25 Hz IMU2 @ ACIP } body axes
NC0724	25 Hz IMU3 @ ACIP }
NC0810	25 Hz edited, "thinned", ACIP data
NC0820	25 Hz ACIP interpolated temperatures

D. 2 Source Tapes Received via NASA LaRC

(a) T/M tapes

<u>REEL NO.</u>	<u>DESCRIPTION</u>
NM0181	OI-1
NC0232	OI-2
NC0415	OI-4
NK1069	OI-1 from CBET01

(b) ACIP Tapes

<u>REEL NO.</u>	<u>DESCRIPTION</u>
NC0114/NC0103/	ACIP housekeeping
NC0116	
NC0214/NC0230/	150 Hz linear cal ACIP
NX1153	

(c) Tracking Tapes

<u>REEL NO.</u>	<u>DESCRIPTION</u>
NC0208	JSC/TRW tracking data
ND0223	Goddard Space Flight Center data
ST5354	AFFTC theodolite data

(d) Other

<u>REEL NO.</u>	<u>DESCRIPTION</u>
ND0619	JSC/TRW Descent BET
ST5357	Jimsphere data (balloon 1; landing - 3½ hours)
ST5356	Jimsphere data (balloon 2; landing - 1½ hours)
ST5355	Jimsphere data (balloon 3; landing + 15 minutes; radar track)
ST5358	Jimsphere data (balloon 3; landing + 15 minutes; optics track)

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16. Abstract This report presents the final products generated by the AMA, Inc. for the ninth NASA Space Shuttle Flight, STS-9, which landed on December 8, 1983. The trajectory reconstruction utilized an anchor epoch of 23 ^h 17 ^m 23 ^s .0 (83843 ^s .0) GMT corresponding to an initial altitude of h~356 kft, selected in view of the limited tracking coverage available. The final state (BET9J13/UN=169750N) utilized IMU2 measurements and was based on processing radar tracking from six(6) C-bands and a single S-band station, plus six(6) photo-theodolite cameras in the vicinity of Runway 17 at Edwards Air Force Base. The final atmosphere (FLAIR9/UN=581199C) was based on a (judgemental) composite of the remote measured data and the 1978 Air Force Reference Atmosphere model as discussed in Section II. The Extended BET is available as STS9BET/UN=274885C. The AEROBET and MMLE input files created are discussed in Sections III and IV, respectively. Plots of the more relevant parameters from the AEROBET (reel number NL0624) are included therein. Appendices are presented defining input parameters, final residual plots, a trajectory listing, and data archival information. The following events are tabulated for later referral:																		
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